





SIR HANS SLOANE, M.D.

Founder of the British Museum.

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THE LIFE
OF
NORTH AMERICAN INSECTS;

ILLUSTRATED

BY NUMEROUS COLORED ENGRAVINGS AND NARRATIVES.

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EXPLANATION OF THE PLATES.

PLATE I.

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|---------|------------------------------|---|---------------------|
| Fig. 1. | <i>Cicindela repanda</i> , | | |
| 2. | " <i>C. guttata</i> . | } | Tiger Beetles. |
| 3. | <i>Calosoma Scrutator</i> , | | |
| 4. | " <i>calidum</i> , | } | Caterpillar Hunter. |
| 5. | <i>Coccinella borealis</i> , | | Lady-bird. |

PLATE II.

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|-----|----------------------------|--------------------------|
| 6. | <i>Copris carnifex</i> , | Bronze Dung-beetle. |
| 7. | <i>Passalus cornutus</i> , | Horned Passalus. |
| 8. | <i>Cetonia Inda</i> , | Indian Cetonia. |
| 9. | <i>Amphicoma vulpina</i> , | Fox-like " |
| 10. | <i>Silpha americana</i> , | Crusader Carrion-beetle. |

PLATE III.

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|-----|-------------------------------|-------------------------------|
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| 12. | " <i>noctilucus</i> , | Lightning " " |
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| 15. | <i>Calandra Palmarum</i> , | Palm-weevil. |
| 16. | <i>Eumolpus auratus</i> , | Gilded Dandy. |

PLATE IV.

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|-----|-----------------------------|-------------------|
| 17. | <i>Cicada Septemdecim</i> , | Red-eyed Cicada. |
| 18. | " <i>Tibicen</i> . | Lyerman. |
| 19. | Larva <i>Cicadae</i> , | Grub of a Cicada. |
| 20. | <i>Coreus tristis</i> , | Squash-bug. |
| 21. | <i>Membracis</i> , | Tree-hopper. |

PLATE V.

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|----------|--------------------------------|-----------------------|
| Fig. 22. | <i>Gryllus Carolina</i> , | Carolina Grasshopper. |
| 23. | <i>Platophyllum concavum</i> , | Male Katy-did. |
| 24. | “ “ | “ |
| 25. | “ “ | Female “ |
| 26. | <i>Acheta nivea</i> , | Tree-cricket. |

PLATE VI.

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|-----|---------------------------|-------------------------------------|
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| 28. | “ “ | Male <i>Saturnia</i> . |
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| 31. | “ “ | <i>Asterias</i> . |

LIFE
OF
SIR HANS SLOANE, M. D.,
FOUNDER OF THE BRITISH MUSEUM.

THE first attempt at forming a Museum in Britain, was made early in the seventeenth century, by John Tradescant, a native of Holland, during the reign of Elizabeth.* He travelled, patronized by the Lord Treasurer Salisbury and Lord Wooton, into various parts of Europe, and in 1620 was on board of a vessel forming part of a fleet sent against the Algerines. Availing himself of that opportunity of pursuing his favourite studies, he collected specimens of Natural History and mostly plants from Barbary and the Mediterranean Islands, and a few years after, we find him settled at Lambeth, where he founded a celebrated Botanic Garden. There he established his Museum, which was the wonder of the age, and was known as Tradescant's Ark. It was much frequented by the principal nobility, who contributed specimens, and among the names of those contributors appear those of the King and Queen, Archbishop Laud, the Duke and Duchess of Buckingham, &c.

John Tradescant died about 1652, and his son, with whom the family became extinct, bestowed the collection on Elias Ashmole, who materially increased it in various departments, and offered to give the whole to the University of Oxford, provided they would erect a building fit to receive it. This was immediately granted, the building erected, and called the Ashmolean Museum.

* The Spider-wort is known in our botanical works under the name of "*Tradescantia Virginica*," in honour of him,

To Tradescant succeeded two other celebrated collectors of natural curiosities—William Courten Charleton, and James Petiver.

Charleton quitted England, and collected in foreign countries during many years natural curiosities, which were estimated at £8,000. This noble Museum, consisting of the greatest variety of insects and animals, corals, shells, petrifications, ancient and modern coins, he bequeathed to Sir Hans Sloane, his old and tried friend, when he died 1702, aged sixty years.

Mr. Petiver, a wealthy apothecary in London, was sufficiently known by his understanding in Natural History all over the world. He distributed printed lists and directions among captains and surgeons of ships, bound to foreign parts ; and by these means procured a very extensive and valuable collection, known under the name of "Museum Petiverianum." He died 1718, and his Museum was purchased by Sir Hans Sloane for £4,000.

Hans Sloane, the seventh and youngest son of Alexander Sloane, who was collector of taxes in the county of Down, Ireland, was born the 16th of April, 1660. Being naturally of a delicate constitution, which excluded him from the usual boisterous pursuits of youth, he appears to have had recourse to the study of Nature at a very early age ; and having determined on following the medical profession, entered on the necessary studies with diligence and ardour. But at the age of sixteen these were unfortunately interrupted by a spitting of blood with which he then became afflicted. This confined him to his chamber for three years. By a rigid course of temperance, abstaining entirely from wine and other fermented liquors, he succeeded in conquering the disease ; and his own prudence induced him to continue ever after in a great degree to adhere to the same strict regimen. It was his favourite maxim, "that sobriety, temperance, and moderation, are the best preservatives that Nature has vouchsafed to mankind ;" and he himself was certainly a proof of its efficacy, as by attention to this maxim, his own life far exceeded the allotted period of man's ordinary existence, when we consider that he lived to the age of ninety-three years.

Upon his recovery, he resorted to London for the purpose of attending his professional studies. The Botanic Garden at Chelsea had at that time very recently been established by the company of Apothecaries. Here he became an indefatigable student, attending also lec-

tures on Chemistry, Anatomy, and Physic. After four years of severe application in London, for his farther improvement he determined to visit the Continent, and in company with two fellow-students crossed over to Dieppe, and from there to Paris, where he attended the botanical lectures of the celebrated Tournefort, and those of Du Verney for Anatomy; at the conclusion of which he visited Montpellier, taking with him letters of recommendation from Tournefort to Monsieur Chirac, then chancellor and professor of the University; by which means he obtained introductions to all the learned in that neighbourhood. Being delighted with the attention he received from Monsieur Magnol,* the professor of Botany, whose herborizing excursions in the neighbourhood he always attended, he parted from his two companions, who continued their travels in Italy, while he remained for a twelvemonth collecting plants; and then, pursuing the same occupation as he travelled through Languedoc, he returned to Paris by way of Toulouse and Bordeaux. After a short residence in the metropolis, he set out for England in the latter end of 1634 with an intent to settle, and follow his profession, having taken his degree of M. D. at Montpellier.

Soon after his return to London, he became acquainted with the celebrated Dr. Sydenham, in whose family he became domesticated, and was by him introduced to professional practice. On the 26th November, 1684, he was proposed by Dr. Martin Lister as a candidate for the Royal Society, of which he was elected a member on the 21st of January following. From this time he became a regular attendant on and frequent contributor to the Society. On the 12th of April, 1687, he was chosen a Fellow of the College of Physicians.

Flattering as were his prospects at home at this period, he did not hesitate to accept an appointment abroad, which promised to afford him the means of enlarging his knowledge of Natural History and Medicine.

The Duke of Albemarle having been appointed governor of Jamaica, applied to his physician, Dr. Barwick, to recommend him a proper person to accompany him to the colony in a professional capacity, who consulted Sloane on the occasion. This appeared to the latter too tempting an opportunity for self-improvement to neglect, and,

* The Cucumber Tree, Umbrella Tree, &c., were named, in honour of him, "*Magnolia acuminata*," "*M. Umbrella*," "*M. glanca*," "*M. grandiflora*," &c.

having asked a short time to consider the matter, offered himself, and was accepted. In a letter to Ray, Sloane thus mentions the subject: "I have talked a long while of going to Jamaica with the Duke of Albemarle as his physician, which, if I do, next to the serving his grace and family in my profession, my business is to see what I can meet withal that's extraordinary in nature in these places. I hope to be able to send you some observations from thence, God Almighty granting life and strength to do what I design ;" to which Ray replies: "If you go to Jamaica, I pray you a safe and prosperous voyage. We expect great things from you ; no less than the resolving all our doubts about the names we meet with of plants in that part of America, as the Dildoe, Mammea, Mangrove, Manchinello, Avellanae purgatrices, and Custard Apple—of most of which, though I am pretty well informed by so knowing and curious an observer as yourself, I should be glad to know what kind of fruit the Mandioca bears ; for whatever some have written, that it is not without, I am confident. You may also please to observe, whether there will be any species of plants common to America and Europe, and whether Ambergrise be the juice of any metal or aloe dropped into the sea."*

With these instructions he prepared for his voyage ; and at length on Monday, September 12th, 1687, he went on board His Majesty's ship *Assistance*, commanded by Captain Lawrence Wright, then lying at Spithead. They weighed anchor the same afternoon, and reached Madeira on Friday, 21st October, where his medical skill was in great demand during the ten days he remained there.

On the 25th November they reached Barbadoes, where they were hospitably entertained by Sir Edwin Steed, the governor. They remained here ten days, when they again put to sea, and passed St. Lucia, Martinique, Dominica, Guadaloupe, Montserrat, and once more landed at Nevis, and then reached St. Christopher, and finally, on the 19th December, they came into Port Royal Harbour.

Dr. Sloane had during the voyage availed himself of every opportunity of examining the natural productions of the different islands at which he touched. In Botany, more particularly, he made great col-

* It is almost needless to remark, that it is now ascertained, that this substance is a concretion formed in the stomach or intestines of the *Physeter Macrocephalus*, or Spermaceti Whale.

lections, and anticipated a rich harvest, now that he reached Jamaica; when an unexpected event blighted all his prospects. The Duke of Albemarle died almost as soon as he had landed, and the Duchess, naturally anxious to return to England, only awaited instructions from the Court at home, in reply to her notification of the Duke's decease. During the necessary interval, the Doctor assiduously exerted himself, and visited all parts of the island. He recorded in a journal a description of every natural curiosity; he collected about eight hundred plants, and employed an artist to make drawings of the birds, fishes, insects, shells, and fruits.

Having remained only fifteen months in the island, Dr. Sloane re-embarked on the 16th March, 1689, in the Assistance frigate, and reached England on the 29th May, the same year.

Immediately on his arrival he settled as a physician. The collections he had brought home with him excited the curiosity and admiration of the learned, and contributed to his public fame. His reputation was now so great, that on the 30th November, 1693, he was elected Secretary of the Royal Society, and, in accordance with his active character and ardent zeal for the interests of science, he immediately revived the publication of the "Philosophical Transactions," which had been interrupted from the year 1687. He continued in this office till 1712, when he was succeeded by Dr. Halley.

Dr. Sloane's professional fame was rapidly extending. In October, 1694, he was chosen physician to Christ's Hospital; and his circumstances appear to have been in so flourishing a condition as to justify his refusal to receive the emoluments of that office; but, because he would not offer a precedent that might be injurious to his successors, he punctually took the money, but constantly applied it to the relief of those belonging to the hospital, who were in greatest need. This appointment he filled till 1730, when age and infirmities obliged him to resign. As it is as a naturalist and patron of science he is connected with this work, we shall merely enumerate his professional appointments and honours; and it is sufficient to mention, that in the College of Physicians he warmly promoted the plan of a Dispensary for the sick poor, which met with so much opposition from the apothecaries.

Although the Doctor does not appear to have been in Her Majesty's household, we are told that he was frequently consulted by Queen Anne, and that in her last illness she was bled by him; but soon after the

accession of George I. he was created a baronet, being the first English physician on whom an hereditary title of honour had been conferred, and was appointed physician general to the Army, which office he enjoyed till 1727, when George II. made him his own physician. He had, in 1719, been elected President of the College of Physicians, which high honour he continued to hold till 1735, when he resigned.

During the intervals of relaxation from a life so laborious as that of an eminent London physician, Dr. Sloane arranged his collections and observations, formed while in the West Indies, and preparatory to his great work, printed in 1696, his Catalogue of Jamaica Plants. This he dedicated to the Royal Society and College of Physicians.

Eleven years after appeared his first volume of his "Natural History of Jamaica." This is a splendid folio, entitled, "A Voyage to the Islands, Madeira, Barbadoes, Nieves, St. Christophers, and Jamaica, with the Natural History of the Herbs and Trees, Four-footed Beasts, Fishes, Birds, Insects, Reptiles, &c., of the last of these Islands; to which is prefixed an Introduction, wherein is an Account of the Inhabitants, Air, Water, Diseases, Trade, &c., of that place, with some Relations concerning the neighbouring Continent and Islands of America, illustrated with the things described, which have not been heretofore engraved, by Hans Sloane, M. D., Fellow of the College of Physicians, and Secretary of the Royal Society."

The introduction, consisting of one hundred and fifty-four pages, contains a general account of the West Indies, their discovery, climate, rivers, soil, productions, customs, trade and diseases, and more particularly those of Jamaica; then follows an account of his voyage in forty-eight pages, and the remainder of the book, occupying two hundred and sixty-four pages, is taken up with an account of the plants.

To the introduction are attached eleven plates of shells, crabs, &c., and a map, and to the body of the work one hundred and thirty-four plates of plants; they are all double folio, and are executed by Michael Vandergucht in the best style of that period, and are a proof of the wealth and magnificence of the author.

It was not till 1725 that Sir Hans had leisure to put the recorded volume to press, though the greatest part of the plates for it were engraved at the time the former appeared; "having," says he, "a multiplicity of business in the practice of physic, which I esteem one of my first cares, and must be minded, if the lives of persons be regarded

with due attention to the several symptoms and changes of their diseases.

The voyage of Dr. Sloane was productive of much subsequent benefit to science, by exciting an emulation both in Britain and on the Continent. Sir Arthur Rawdon, upon viewing this splendid collection, sent James Herbert, a skilful gardener, to Jamaica, who returned with a ship almost laden with plants, in a vegetating state, and with a great number of dried specimens. Of the latter, Sloane had all such as were new before he published his first volume. Many of his living plants succeeded in the garden of Sir Arthur, at Moyra, in Ireland; and many were distributed into the garden of the Bishop of London, at Fulham, Dr. Uvedales, at Enfield, the Chelsea Garden, and especially that of the Duchess of Beaufort, at Badminton in Gloucestershire; the botanic gardens of Amsterdam, Leyden, Leipsic, and Upsal, shared their varieties.

Sir Hans was ever ready to promote the interests of science by his purse and his exertions. He advanced £700 to the College of Physicians, which he allowed to be paid off by instalments; and in 1721 he made the same society a present of £100. The same year (having become lord of the manor of Chelsea, by purchase, in 1711), he gave to the Company of Apothecaries the freehold of their botanical garden there, upon the sole condition, that they should present yearly to the Royal Society fifty new plants grown in the garden, till the number should amount to 2,000, and pay a quit rent of £5 per annum, which was cheerfully accepted, and the number, of course, was completed in the year 1761, but the practice was continued till 1773, at which time 2,550 were completed. Sir Hans also contributed largely towards the expenses of the hot-houses and other necessary erections. In testimony of their respect for him, the Company, in 1733, erected in the centre of the garden a marble statue, executed by Rysbrach, representing him in a full-bottomed wig and doctor's gown. On the pedestal is a Latin inscription, commemorating his donation and the design and advantage of it.

Upon the death of Sir Isaac Newton, in 1727, Sir Hans was elected President of the Royal Society, having previously served the office of Vice-President. To this Society he had ever liberally contributed; besides a hundred guineas he presented them with a bust of King Charles the Second; and when at the age of eighty he begged to retire

from so arduous an honour, in 1740, the Society entreated his permission, as a mark of respect for his eminent services, that they might continue his name on the list of their council as long as he should live.

Of his numerous charities it is difficult to give an idea. He was a governor in most of the London hospitals—a liberal benefactor to them during his life, and left them considerable legacies at his death. To the poor he was uniformly a considerate and attentive friend, assisting them with money, and prescribing for them in sickness, even after he had retired from public life to his house at Chelsea. To foreigners he was extremely courteous; and kept an open table once a-week for his learned friends, particularly the members of the Royal Society.

But it is his Museum with which we have more to do. From a very early period he appears to have commenced forming it. His collections during his West Indian voyage were the nucleus. The earliest notice of it occurs in Evelyn's Diary, who, under the date of April 16, 1691, mentions—"I went to see Dr. Sloane's curiosities, being a universal collection of the natural productions of Jamaica, consisting of plants, fruits, corals, minerals, stones, earth, shells, animals, insects, &c., selected with great judgment; several folios of dried plants; and one which had about eighty-seven sorts of ferns, and another of grapes; the Jamaica pepper, in branch, leaves, flower, fruit, &c. This collection, with his journal and other philosophical discourses and observations, is indeed very copious and extraordinary, sufficient to furnish a history of that island, to which I encouraged him. It received its first and perhaps principal increase, however, in 1702, upon the death of his friend Mr. Courten, who we have seen bequeathed his extensive and valuable museum to Sir Hans, upon condition of his paying certain legacies specified in his last will. What was the precise state or value of this accession we have no means of knowing, as there exists no separate catalogue of its contents. The Biographical Dictionary, indeed, informs us that there are MS. catalogues which, swelled with short histories and accounts of their contents, amount in all to thirty-eight volumes in folio, and eight volumes in quarto. But these catalogues were stated, at the time of Sloane's death, to be those of the whole Museum as then existing; and we know that, from many other sources, Sir Hans obtained augmentations; and the account he himself gives of it after the purchase of Petiver's collections, compared

with that published after his death, will show that it was constantly increasing.

Apologizing in 1725 for the delay in publishing the second volume of his *Natural History of Jamaica*, he says, "The putting into some kind of order my curiosities, numbering them and entering their names in books, which was necessary in order to their preservation and uses, hath taken me up some I have had to spare from the exercise of my profession; and because some people have represented me careless and negligent in not giving this second volume sooner, I think it proper in my own justification to acquaint the reader, that I have entered into books, and numbered these natural and artificial things following."

The numbers in the first columns are those he there gives; those in the second column are from the list as transmitted to the British Museum after his death.

From the comparative statement of its treasures in the years 1725 and 1753 it will easily be perceived that Sir Hans Sloane himself most materially increased every department of this magnificent collection. In January, 1741, he commenced removing them, together with his library, from his house in Bloomsbury, to that at Chelsea; and having entirely completed the transfer by May following, he retired thither to enjoy the remainder of his life among his books and scientific treasures and the society of the learned. Here, in 1748, he was honoured with a visit from the Prince and Princess of Wales, the father and mother of King George III. Dr. Mortimer, Secretary of the Royal Society, conducted the Prince and Princess into the room where Sir Hans was seated, being aged and infirm. The Prince took a chair and sat down by the good old gentleman for some time, when he expressed the great esteem and value he had for him personally, and how much the learned world was obliged to him, for his having collected such a vast variety of curious books, and such immense treasures of the valuable and instructive productions of nature and art. Sir Hans' house formed a square of about one hundred feet on each side, enclosing a court and three front rooms—had tables set along the middle, which were spread over with cases filled with all sorts of precious stones, in their natural beds or state as they are found in the earth; except the first, that contained stones formed in animals, which are so many diseases of the creature that bears them; as the most beautiful pearls, which are but warts in the shellfish; the bezoar, concretions in the stomach, and

stones generated in the kidney and bladder, of which man wofully knows the effects : but the earth in her bosom generates the verdant emerald, the purple amethyst, the golden topaz, the azure sapphire, the crimson garnet, the scarlet ruby, the brilliant diamond, the glowing opal, and all the painted varieties with which Flora herself might wish to be decked ; here the most magnificent vessels of cornelian, onyx, sardonyx, and jasper, delighted the eye, and raised the mind to praise the great Creator of all things.

When their Royal Highnesses had viewed one room and entered another, the scene was shifted ; for when they returned, the same tables were covered for a second course with all sorts of jewels, polished and set after the modern fashion, or with gems carved or engraved, the stately and instructive remains of antiquity. For the third course the tables were spread with gold and silver ore, with the most precious and remarkable ornaments, used in the habits of men from Siberia to the Cape of Good Hope, from Japan to Peru, and with both ancient and modern coins, and medals in gold and silver, the lasting monuments of historical facts ; as those of Prusias, king of Bithynia, who betrayed his allies ; of an Alexander, who, mad with ambition, overran and invaded his neighbours ; of a Cæsar, who enslaved his country to satisfy his own pride ; of a Titus, the delight of mankind ; of a Pope Gregory the XIII. recording, on a silver medal, his blind zeal for religion, in perpetuating thereon the massacre of the Protestants in France, as did Charles the IX., the then reigning king in that country. Here might be seen the coins of a king of England crowned at Paris ; a medal representing France and Spain striving which should pay their obeisance to Britannia ; others showing the effects of popular rage, when over-much oppressed by their rulers, as in the case of De Witt in Holland, the deliverance of Britain by the arrival of William, the glorious exploits of a Marlborough, and the happy sway of the present royal family.

The gallery, one hundred and ten feet in length, presented a most surprising prospect. The most beautiful corals, crystals, and figured stones, the most brilliant butterflies and other insects, shells painted with as great variety as the previous stones, and feathers of birds vying with gems. Here the remains of the world before the Deluge, excited the awful idea of that catastrophe, and are so many evident testimonies to the truth of Moses' history.

Then a noble vista presented itself through several rooms filled with books and many hundred volumes of dried plants ; full of choice and valuable manuscripts ; the noble present sent by the French king to Sir Hans, being prints of his collection of paintings, medals, statues, palaces, &c., in twenty-five large atlas volumes, besides other valuable things too numerous to mention here.

Below stairs, some rooms were filled with curious remains of antiquities, from Egypt, Greece, Etruria, Rome, Britain, and even America ; others with large animals preserved in the skin ; the great saloon lined on every side with bottles filled with spirits, containing various animals.

The halls were adorned with the horns of various creatures, as of the double-horned rhinoceros of Africa, and deer's horns from Ireland, nine feet wide, and with weapons of different countries, among which it appears that the Mangalese, and not our most Christian neighbours, the French, had the honour of inventing that butcherly weapon—the bayonet. Fifty volumes in folio would scarcely suffice to contain a detail of this immense museum, consisting of above two hundred thousand articles.

Their Royal Highnesses were not wanting in expressions of their satisfaction at seeing a collection which surpassed all the notions or ideas they had formed of it, from even the most favourable accounts. On this occasion the Prince showed his great reading and happy memory ; for in such a multiplicity and such a variety of the productions of Nature and Art, upon anything being shown to him that he had seen before, he was ready in recollecting having read of it ; and upon viewing the ancient and modern medals, he made so many judicious remarks, that he appeared to be a perfect master of history and chronology. He expressed the great pleasure it gave him to see so magnificent a collection in England, esteeming it an ornament to the nation, and expressed his fixed sentiments, how much it must conduce to the benefit of learning, and how great an honour will redound to Britain, to have such a grand repository established for public use to the latest posterity.

Amidst these tranquil occupations, he attained an age far beyond the period assigned by the Psalmist to those very few, “ who, by reason of their strength,” exceed, though “ in labour and sorrow,” man’s allotted portion of existence, and this, without these painful concomitants,

even to the ninetieth year of his age. From that time, however, he became sensible of a gradual decay, and his friend, George Edwards, the naturalist, has left us the following interesting but melancholy narrative of his latter days : " Sir Hans Sloane employed me for a great number of years in drawing miniature figures of animals, &c., after nature, in water colours, to increase his very great collection of fine drawings by other hands ; which drawings are now all fixed in the British Museum for the help and information of those in future generations that may be curious or studious in Natural History. Sir Hans in the decline of life left London, and retired to his manor-house at Chelsea, where he resided about fourteen years before he died. After his retirement to Chelsea, he requested it as a favour to him (though I embraced his request as an honour done to myself), that I would visit him every week, in order to divert him for an hour or two with the common views of the town, and with anything particular that should happen amongst his acquaintances of the Royal Society, and other ingenious gentlemen, many of whom I was weekly conversant with, and I seldom missed drinking coffee with him on a Saturday during the whole time of his retirement at Chelsea. He was so infirm as to be wholly confined to the house ; except sometimes, though rarely, taking a little air in his garden in a wheeled chair. Confinement made him very desirous to see any of his old acquaintances to amuse him. During this latter part of his life he was frequently petitioned for charity by some decayed branches of families of eminent men, late of his acquaintance, who were famous for their learned works, &c., which petitions he always received, and considered with attention, and provided they were not found fraudulent, they were always answered by his charitable donations. He often desired that I would inquire into the merits of such petitions ; and, if found satisfactory, he commissioned me to convey his bounty to the distressed. The last time I saw him, I was greatly surprised and concerned to find so good a man in the agonies of death. This was on the 10th day of January, 1753, at four o'clock in the afternoon. He died on the eleventh, at four in the morning, being aged 93 years. I continued with him later than any one of his relations, but was obliged to retire, his last agonies being beyond what I could bear ; though under his pain and weakness of body he seemed to retain a great firmness of mind, and resignation to the will of God."

Sir Hans had married, in 1695, Elizabeth, daughter of Alderman Langley of London. She died in 1724, and was buried at Chelsea, where, on the 18th of January, 1753, her husband's body was deposited in the same vault with her. A monument was erected to their memory, consisting of a pedestal surmounted by a portico, which is supported by four pillars, under which is an urn, entwined with serpents. Emblematical of his profession is the following inscription :—

“ In memory of Sir Hans Sloane, Bart, President of the Royal Society and of the College of Physicians, who died in the year of our Lord 1753, the ninety-second year of his age, without the least pain of body, and with a conscious serenity of mind ended a virtuous and beneficent life. This monument was erected by his two daughters, Elizabeth Cadogan and Sarah Stanley.”

On the north side of the monument is a memorial of Lady Sloane.

In conformity with the custom of the time a funeral sermon was preached by Dr. Zachary Pearce, at that time Bishop of Bangor, but who had been expressly forbidden by the deceased to give way to the gross flatteries so prevalent on such occasions, Sloane very properly accounting it a degree of profanation to debase with the praises of human excellence that pulpit which should be devoted to display to men the attributes of the Deity, and to instruct them in his laws.

Two daughters only survived Sir Hans Sloane—a son and daughter having died in their infancy. Sarah, the eldest, was married to George Stanley, Esq., of Ponilton in Hampshire, and Elizabeth married Lord Cadogan. Unwilling to deprive these ladies of so large a portion of his fortune, and yet reluctant to have his museum divided after death, and equally reluctant to deprive his country of the benefit of so valuable a collection, Sir Hans, by his last will, bequeathed this magnificent result of the exertions of his whole life to the nation, on condition that Parliament should reimburse his family to the extent of £20,000, a sum, though large, said to be not more than the intrinsic value of the gold and silver medals, ores, and precious stones in it ; and he himself states in his will that the first cost to him had been at least £50,000. In consequence of this, immediately after his death, above forty of the trustees, appointed by the will to take charge of his museum, met the Lord Cadogan and the other executors at the manor-house, Chelsea. His Lordship produced the will, and acquainted the trustees with the codicils containing the dispositions for continuing his

collection together at Chelsea, and for giving a small part to his family, and for that purpose, to make an offer of the said museum to the King or to the Parliament of England for £20,000, to be paid to the family, and if the same was accepted and continued at Chelsea, to give the manor-house and lands at Chelsea, with the museum as now disposed, which would save the expense and hazard of removing the same, and to be kept open at proper hours for the access of the studious and curious. Then Mr. Sloane acquainted the trustees, that, the executors being apprehensive of danger, the medals of gold, silver, and some curious copper coins, and the precious stones, such as pearls, rubies, emeralds, &c., and the vases of gems, &c., had been removed for safety to the Bank of England, and that two of the executors had seen them all packed up. The Earl of Macclesfield having been desired by the trustees to take the chair, the will and codicils were read. An account also of the nature and value of the museum, and an abstract of the articles it contained, was read by Mr. James Empson, who had taken care of the museum for many years past, and was then appointed secretary to the trustees. Sir George Lyttleton then moved, and Mr. West seconded, that a memorial should be presented to His Majesty relating to this matter; and a committee was appointed to draw up the same.

The result was, that Parliament immediately closed with the offer; and, in 1753, an Act was passed entitled, "An Act for the purchase of the Museum or collection of Sir Hans Sloane, Bart., and of the Harleian collection of MSS., and for procuring one general repository for the better reception and more convenient use of the said collection, and of the Cottonian library in addition thereto."

By this act, the sum of £100,000 was ordered to be raised by a lottery, and certain great officers of state, together with private individuals as representatives of the families of the principal contributors, and others, were incorporated by the name of "Trustees for the British Museum."

The first act of these trustees was to provide a proper building for the reception of the collections confided to their care; and after various proposals, they at length fixed upon the Mansion, built about the year 1680, by Ralph, first Duke of Montague, who, being at that time Ambassador at Paris, sent over French artists for erecting and adorning the edifice he had in contemplation. This palace, together

with its garden and appurtenances, occupying in the whole an area of seven acres and twenty perches of land, was ceded by the representatives of the Montague family for the moderate sum of £10,000. The necessary repairs (which, the house having stood long empty required, proved very expensive), were immediately proceeded upon; and the proper book-cases and cabinets having been completed, and the collections removed thither, the museum was at length opened for study and public inspection, January 15, 1759. The sum actually netted by the profits of the lottery under the Act of Parliament was £95,194 18s. 2d. From that time to the present it has been gradually extended and increased by donations, bequests and purchases—but to trace the progress of this increase belongs not to this work. It has very recently been newly arranged and considerably improved in every respect, and a very copious and interesting account of its present state may be obtained from the twenty-eighth edition of the Synopsis of the Contents of the British Museum, published in 1834.

We have seen him born with a natural delicacy of constitution, which nothing, it is probable, but rigid temperance and self-denial could have sustained; yet cheerfully submitting to these restraints, while cultivating the abilities his Maker had bestowed upon him. We have seen him carry with him the good wishes and recommendations of his instructors, while pursuing his education in foreign countries; and, finally, brought into active life at home, under the auspices of men of high talent and reputation, whose kindness and judgment the result fully justified. His middle age was passed in active benevolence, alleviating “the evils that flesh is heir to,” among all classes, from the sovereign on the throne, to the casual and dependent inmate of an hospital, receiving honours from the one, and blessings from the other; a generous promoter of every institution calculated to enlarge the mental powers of man or relieve his bodily infirmities; and, at length resigning his soul into the hands of the God who gave it with humility and resignation, and with admirable consistency, so rarely practiced, leaving direction that no sycophantic eulogy should be pronounced over his remains, but that the occasion should be improved by those salutary reflections which such a spectacle was calculated to excite. Never were the vanity of all earthly blessings, the fragility of all earthly possessions, however connected with science, literature, and all that we are accustomed to consider as indicative of mental

superiority,—never were the futility of such things alone more strikingly illustrated than in the present instance, “seeing that wise men also die and perish together, as well as the ignorant and foolish, and leave their riches to others.” Blessed are they who, like Sir Hans Sloane, rate such pursuits at their real value, as preparatory to a higher state of existence; and who, like him, “having provided for their own,” bestow their superfluities on the improvement of their fellow-men. Such men are the “salt of the earth.”

As the founder of the British Museum, he merits the admiration of every one to whom the national progress in literature, science, and art is dear. If we rightly appreciate the advantages of an institution, calculated to foster a taste for those pursuits that elevate man above sensual appetites and sordid gain—an institution intended to assist the author, the artist, and the philosopher in their several studies—an institution which on the most liberal scale, is open to all who, from an enlightened curiosity, may wish to inspect, or for particular purposes to consult it,—if such an institution is valued in an age distinguished by its efforts to educate all classes, it is to Sir Hans Sloane the merit is due,—to him is owing not merely the respect of all who, like ourselves, are engaged in the promotion of the delightful study of Natural History, but the gratitude of the nation at large.

TO MY READERS.

PHILOSOPHY has invested all, even the commonest objects of Nature, with charms to the uneducated unknown. The conditions of our being are such, that we are tied by destiny to every object ; and the more intimate and appreciable the connection, the more interesting and important to us, becomes a full understanding of our mutual relations and dependencies in the vast arena of Life. No part of Natural Science, therefore, can be considered unimportant or devoid of interest. Still there are differences in our appreciation of its individual parts, as there are differences in our tastes and mental capacities. If we are accustomed, like the sportive birds in their splendid plumage and graceful motions, to look down upon the mammalia as the real labouring class in the dominion of the Animal Kingdom ; if we despise the Reptiles on account of their ugliness and the deadly venom which they contain ; still, we may approach with pleasure the class of Fishes, the greatest part of which are excellent food, a valuable article of commerce, and a great source of wealth to many nations.

But no branch of Natural History deserves a more careful and thorough study than the class of Insects, because none is more abounding in use or injury to man. The study and knowledge of the companions that swarm around us on every tree and flower, in the air about us, and on the earth beneath us, must be important and inter-

esting to every one, of whatever mental capacity or taste. And it has been very generally so considered for the rich and poor, lettered and unlettered, the statesman and philosopher, manufacturer and merchant, husbandman and horticulturist, clergyman and physician, have often made this study the principal occupation of their leisure hours.

There is no class of animals with which so many persons have been occupied, and on which so many valuable and splendid works have been published, as on Insects, particularly Beetles and Butterflies. None of Earth's creatures have attracted more universal admiration than these. Many to whom the Book of Nature is a sealed book, have been enticed by the splendour of their colour, and their fairy-like motions, to hunt for them in meadows, fields, and woods, to place them as ornaments in rich frame-work upon the walls of their parlours, or to nourish and raise them with the greatest care in their rooms, that they may not lose a single hair of their magnificent, variegated dress.

No class of animals presents so great diversity of occupation, and so many grades of society, as the Insects. Here we see the industrious labourer busy at his work, there the lazy lounging beggar; here upon the leafy boughs, or before the gates of their subterranean abodes, myriads of musicians are playing their fiddles, and there the skilful artist is building his wonderful dwelling; while above in the blue sky flutters a high nobility, clad in gold, silver, purple, and silk, fed on the nectar of flowers; and on the earth below are lurking troublesome drones, and disgusting parasites.

Now, although we have a great number of learned men in our country who have distinguished themselves in the different branches of Natural History, still few works have been published on the subject. Much credit is due to Professor Godman for his excellent work on American Mammalia, which has been augmented by the late publications of Audubon; also to Wilson, Lucien Bonaparte, and

Audubon, who, in their splendid works, have minutely described the North American Birds; as well as to Professor Holbrook for his work on North American Reptiles. Still, in spite of all this, we have no general work on North American Insects, except a few numbers of the American Entomology, by Thomas Say; Major Leconte's Iconography of some genera of Butterflies; and Dr. Harris' elaborate report on the injurious Insects of Massachusetts.

It is time that our people in general, and particularly our youth, are made acquainted with a class of animals which everywhere surround us, day and night, and which furnish us amusement, food, colouring substances, and medicines, in order that they may be able to distinguish the useful from the injurious ones, the harmless from the noxious, and to discover those which may furnish new articles for manufactures, commerce, and domestic industry.

For these reasons I have yielded to the solicitations of numerous friends, and am about to lay before the North American public the fruits of my Entomological investigations, pursued for many years during my extensive travels in Europe, Asia, and on this Continent, and accompanied by a thorough examination of all the works published on this subject in the various European languages.

I propose to issue this work in monthly numbers, each number containing a coloured engraving representing several Beetles, Bugs, or Butterflies, &c. Six numbers will constitute a volume, and will be accompanied by an engraved portrait of a distinguished Naturalist, Amateur, or Patron of this Science. It is my design to make this work a valuable ornament for the parlour table, as well as an instructive and amusing companion; and should it meet with their approbation, I shall continue my investigation until I have presented my readers with a faithful, life-like representation of all the principal species of North American Insects. To accomplish this, I am aware will be attended with no little difficulty, for, as in the Mammalia and

Birds, so also among Insects, we have diurnal and nocturnal ones. Thus the Diamond Beetle shows its gold, ruby, emerald, and hyacinth colours in the clear and bright sun-light, and the same is the case with many Butterflies, who are on that account called diurnal ; while the Hawk Moths, with a suspicious modesty, issue from their dwellings, adorned with bridal dresses, only at twilight : and only towards midnight are seen the gigantic Cecropia, and many others, in their variegated cloaks, or the unicoloured, unpretending Luna ; and these Insects are hence called nocturnal. In order to perfect the task I have in hand, therefore, I shall continue to ramble many more sunny days, and many more tropical nights, guided by the dim and twinkling lamps of heaven, through open fields, dark woods, and damp meadows, stimulated by the satisfactory assurance that these labours cannot fail of being useful to all students of Nature, and encouraged by the hope that thus a way may be opened to a more general knowledge of Natural History, and a deeper admiration of the ten thousand sublime and beautiful creatures that, in one common song of praise, pour out their gratitude and proclaim their dependence upon one common Father.

Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



generally noxious to man. But even here we find Nature's great doctrine of compensation fully carried out. If we find many genera of insects, (which is the case principally among the noxious Butterflies,) so prolific, that if allowed to increase, they would devour all the vegetables on earth, and thus destroy all living beings by famine, we at the same time see how the Great Ruler of Nature has prevented their increase by making them the proper food of others.

The number of insects which feed on others is immense. But, in spite of the numberless enemies of their own class, they have still others. There are a countless host of insects that often destroy the trees, bushes and vegetables of our gardens, fields and forests, by eating their leaves, and such are very generally despised on that account, much as we may admire their beautiful colours and motions. If we were able, we would destroy them all at once. But we forget that our trees, with all their beautiful foliage, are not more pleasing to us than the feathered warblers that build their nests on the branches, and gladden us with their happy songs. We should take from our groves and forests half their charm if we were to expel our Robins, Thrushes, Mocking-birds, Jays, Orioles, Tanagers, Finches, Black-birds, Cedar-birds, and many hundred others. And yet, were we to annihilate

Caterpillars, our gardens, woods, and fields would soon be abandoned by the whole feathered tribe who feed on them, and melancholy sadness shroud the abodes of man. Ardently, then, would we long for the return of the noxious Caterpillars, and with them the joyous songsters of the forest. In like manner, we ignorantly despise, and contrive means to destroy many birds who devour our vegetables, without considering that they rid us of a much greater evil in destroying millions of mice and noxious insects. So beautifully is the doctrine of compensation illustrated throughout the Animal Kingdom, as well as in all the objects of Nature.

Now among the Beetles of prey, which feed on other living insects, I mention first the handsome *Lady-bird*, (*Coccinella*), (Plate I. Fig. 5), which is quite small, of a discoid form, and for the most part yellow or red, with or without spots; but some species are black. They look like coloured turtles, and are known to every child. But few persons know that these little creatures are of great service in the economy of Nature. They are found upon all those trees and shrubs which are infested with the plant-lice (*Aphis*) which are so injurious to peach, pear, apple, and plum-trees, and others, as well as rose-bushes and other shrubs, and they make their principal food of these disgusting and destructive creatures.

The grubs (larvæ) of the Lady-birds are much the most voracious, and on that account are armed with two very powerful jaws. They creep along on the leaves and branches of plants until they find plant-lice, among which they then ravage like wolves in a sheep-fold. When full grown, their body is generally half an inch long, of an oblong form and blueish colour, with four or six yellow spots, which generally become black spots upon the red wing-covers of the perfect insect. They remain in the condition of larvæ about two weeks, when they fasten themselves upon a leaf, cast their skin, and metamorphose themselves into a variegated or ash-coloured, short cocoon, from which the perfect Lady-bird issues in about a fortnight.

A great variety of these insects are found throughout the whole world, but the largest species we have in North America is the Northern Lady-bird (*Coccinella Borealis*, Fig. 5), which is principally found upon the leaves of the Pumpkin vine, and several other species of gourd (*Cucurbitaceæ*). Here they feed in company with their grubs, not on the leaves of any of these plants, as many believe, but on the plant-lice and the larvæ of the Squash-bug which abounds on those vines.

Many other species of this genus, which are found in this country, are named according to the number

and form of the spots on their wing-covers. Thus we have

Coccinella	bi-punctata	} and many others.
"	immaculata	
"	ursina	
"	novem-punctata	

These Beetles were, several years ago, recommended as a superior remedy for tooth-ache, which was said to be immediately cured by putting one or two mashed Lady-birds into the hollow tooth. I tried this application in two instances, and the tooth-ache was immediately relieved, but whether the remedy, or the faith of the patient, acted therapeutically, or the tooth ceased aching of itself, I confess I do not pretend to know. Thousands of these insects may be gathered in summer with the greatest ease, and may be kept for many years in a bottle of alcohol, and if any one wishes to test the therapeutic value of the Coccinella he can try it.

Popular superstitions are sometimes beneficial in their results, and this has often been the case with the animals of which we speak. Thus the ancient Egyptians regarded as sacred a certain dung Beetle (*Scarabæus Sacer*), because by feeding on putrid substances, and consuming them, it purified the air and thus proved beneficial to man. For the same reason the Turkey-buzzard, on account of its destroying

Southern, and Western States of the Union, and with them, many other kindred species.

The Tiger-beetles, or *Cicindelæ*, belong to a large family called "Carabi," which Dr. Bonelly (Mem. de Turin, 1809) has divided into many genera, and after him Professor Latreille (in Cuvier's *Regne Animal*) into many more, and Count Dejean has written many volumes describing only their different forms.

The handsome *Caterpillar-hunters* (*Calosoma Scutator*, Plate I. Fig. 3, and *C. Calidum*, Plate I. Fig. 4) belong to the same family. I have given them this name because they may be seen every morning and evening upon the branches of trees, looking out for caterpillars and devouring them.

The real Carabi, which these animals resemble, are also distinguished by the same carnivorous habits, by their magnificent colours, and by generally being found under stones, or running swiftly over the sandy soil, on which latter account the Germans call them *Sandläufer* (Sand-runners). The countries of Europe produce a greater variety of these animals, principally in the Alps and all other mountainous regions, and the splendid, blue-coloured, large *Carabus* (*Procrustes violaceus*) still brings to my mind the most pleasing recollections of the disinterested hospitality and affectionate kindness of the Tartars who dwell in the lovely Peninsula of the Crimea. It was in the month

of June, 1825, that I visited that delightful country. The romantic valley of Baidary, covered with luxuriant and variegated flowers and a great variety of the most beautiful insects, offered me an immense field for collecting plants and insects, a catalogue of which I published in St. Petersburg in 1827. On the first excursion I made in that country, I was followed at a distance by a dozen mysterious-looking young Tartars, who, as soon as they perceived me picking up those violet-coloured carabs from under the stones, and putting them into a vial, suddenly all disappeared. But judge of my astonishment, on my return in the evening, in finding a crowd of Tartars in front of my house. Had I been less acquainted with the kind feeling of those people, and particularly their hospitality towards strangers, I should certainly have witnessed that crowd with some alarm. But as I approached the house, a number of them walked solemnly towards me, the right hand on the breast, as a sign of salutation, and with the left presented me jars filled with these splendid carabs, as a token of their affection for me.

Nor was this all, for two days after when I left Baidary for Theodosia, and when almost ten miles distant from the former place, I heard behind me the swift trotting of horsemen, and, turning round, met one of those friendly Tartars of Baidary, who had followed me for the purpose of presenting me another jar full of

those carabs. No persuasion could induce any one of these Mohammedans to accept the least recompense for any service or for my board ; and in all their villages and towns I was exceedingly annoyed by the inhabitants, for every one offered his house as my residence, from the tolerant Mullah, or Mohammedan priest, to the unsophisticated country peasant of Jenicale and Kertsch ; the industrious manufacturers in the cities of Baktschiseray or Achmetschat, as well as the opulent merchant of Kosloff. All vied with each other in showing hospitality and munificence to the stranger. Would that stranger could repay them !

It may seem a long digression, but the lovely insects of that place, as they appear in my cabinet, or are pictured forth on canvass for the inspection of my readers, excite in me a thousand grateful emotions, that “ come crowding thickly up for utterance.” It is worth a visit to the Peninsula of the Crimea, to behold these beautiful insects ; it ten times repays one to make the acquaintance of its lovely inhabitants. The climate there is an eternal spring. The undulating soil is rich in all kinds of delicious fruits and vegetables—the scenery highly romantic, consisting of ancient castles in ruins, at the foot of which are seen domestic camels, and on the open fields before them, herds of four-horned sheep.

Here is “ the land of the cedar and vine,
Where the flowers ever blossom, the beams ever shine ;

Where the citron and olive are fairest of fruit,
And the voice of the nightingale never is mute ;
Where the tints of the earth and the hues of the sky,
In colour though varied, in beauty may vie,
And the purple of ocean is deepest in dye;
Where the virgins are soft as the roses they twine,
And the spirit of man is all but divine ! ”

Although this terrestrial paradise now belongs to Russia, and its inhabitants have lost their national independence, still they have preserved their genuine Caucasian beauty ; and while gazing with admiration upon them, it has often occurred to me that the Apollo of Belvidere, the Venus de Medicis, and the Madonna of Raphael must have been accurate copies of the men and women of the Crimea.

Their morals are not less to be admired than their beauty. Drunkenness, quarrelling, riots and murders are entirely unknown there. You may travel unarmed and laden with riches from one end of the country to the other, without being molested ; such a thing as a thief is never heard of there, and everywhere, in the cottage and in the palace, you will be hospitably received and entertained as an old friend. If the rest of the world were more like the poor people of the Crimea, “ ’t would be something.” That country was conquered at the end of the last century by the famous Potemkin the favourite of Catherine II., and its sovereign, the Khan, sent a prisoner to St. Petersburg, where he died.

In this connection, and at the risk of still further digressing from the subject-matter of this work, I feel it a duty incumbent upon me not to let this opportunity pass without doing an act of simple justice to the memory, and the character of one of the most distinguished Naturalists of his time, Pallas, long a resident of the Crimea.

Only a short time since, the Hon. Samuel Arnold, Lieutenant-governor of Rhode Island, handed me Mr. Ditson's written work, entitled "Circassia, or a tour to the Caucasus," in which I was surprised to find some statements which I knew to be erroneous, and which I can only account for from the superficial and one-sided view of things a traveller is liable to take who rapidly passes through a country and receives his impressions from only partial sources. But the erroneous impressions which Mr. Ditson conveys with regard to the world-renowned Naturalist, Pallas, particularly demand correction from me, because, during my residence in St. Petersburg, I was acquainted with his most intimate friends, and familiarly knew his whole life and character. Besides, afterwards, at Sympheropol, in the Crimea, in 1825, I was hospitably received and entertained by Madame Caroline Ivanowna Pallas, the widow of that distinguished Philosopher, and from her own lips of course acquired the most accurate and reliable

information with regard to herself and her husband.

Speaking of Baktschiseray, the former residence of the Khans of the Crimea, Mr. Ditson says, "In this vicinity lived Pallas, who came here and wrote his famous book of travels, and so pleased the Empress Catharine, by the glowing description he gave of the country, that she thought she could not reward him better than by giving him a portion of it, with an income of two thousand rubles. Pallas considered it but as a species of exile, and was overwhelmed. He saw that he was the dupe of a simple desire to make the newly-acquired territory grateful to his sovereign, and he sat himself down, without the power or courage to complain, suffering in body and mind till the shades of an unending night veiled him from the world."

Now the facts are these: Professor Pallas, Member of the Imperial Academy of Science at St. Petersburg, Councillor of State, and Knight of several Orders, was born in 1741, at Berlin, where he acquired a distinguished reputation by his researches and writings on Natural History. When the Empress, Catharine II. of Russia, learned the fame of this great man, and his eminence in his department of science, she invited him to her court, and then proposed to him, as a Naturalist, to survey Siberia, the Crimea, and

the Cis and Trans-Caucasian provinces. He accepted her proposition, and spent several years in travelling through the countries, all the while being recompensed in a princely manner by the Empress, and journeying in the greatest style and expense. His many classical and valuable works with regard to the Zoology and Botany of those provinces, published in French, German, and the Russian languages, were the result of his extensive labours, and to this day attest his eminent ability in the department of Natural History.

On his return to St. Petersburg, he offered to sell his large collection of natural productions for the sum of fifteen thousand roubles; but when the Empress heard of it she wrote him, telling him that he knew very well how to write a learned work, but that he did not know how to make a calculation, for his cabinet was worth twenty thousand roubles, and that she would be the purchaser of it at that price, under one condition, viz., that the cabinet should remain in his house for his use as long as he lived. Accordingly, she accompanied her letter to Pallas with the twenty thousand roubles.

This delicate and munificent present of the Empress, was followed by her settling upon him large estates in the Crimea, where he preferred to reside; but a great portion of these estates he sold, after

the death of the Empress, to the famous Armenian, Natarra, who owned the large crown-diamond of Shack Nadir of Persia, which was purchased by Catharine, and is still now seen in the Eremitage, among the other crown-jewels.

In view of all these facts, we cannot understand how Pallas became a dupe of the Russian Government, or could consider himself as exiled to the Crimea, as Mr. Ditson says. It was not so, as he resided there only when he preferred it; and after the death of the Empress, when he was over sixty years old, he became anxious to see his fatherland once more. Accordingly, he settled on his wife, who preferred to remain there, a very fine estate near Sympheropol, and he went to Berlin, his native place, where he died at the age of seventy years.

Pallas was twice married. He had by his first wife only one daughter, who was married to Count Wimpfeu, a General in the Russian army, who was killed, in 1805, on the battle-field of Austerlitz. His second wife was still alive, and resident in the Crimea, in 1825, when I was there. Although over sixty years of age, she was the life of society, a lady of great intellectual attainment, and an accomplished scholar. She spoke fluently the Russian, French, Italian, German, and Tartar languages.

A proof of the high estimation in which Pallas was held by the Russian Government, is the fact, that it bestowed on his wife and daughter, after his death, a pension of three thousand roubles each, annually.

THE CLASSIFICATION OF INSECTS.

HAVING spoken of the different parts of which the bodies of Insects are composed, and mentioned some of their general characteristics, with the interesting associations connected with them, I trust I have awakened in my reader something of a curiosity to know more of this department of Natural Science, and in order to facilitate the acquirement of such knowledge, I now deem it necessary to make a few remarks upon the Classification of Insects.

The science which treats of Insects is called *Entomology*. It shows us the division of Insects into different Orders, Families, Genera, and Species. It makes us acquainted with their external characteristics and their nature; their injuries and their uses.

The name Insect is given to those small animals which are *invertebrated*, that is, whose bodies are not supported by a bony frame, but are composed of many rings or *intersections* jointed together. Hence the

name Insect. Each of these has, at least, six legs, when in a perfect condition.

Although Insects differ from the *vertebrate* animals, viz., from Beasts, Birds, Reptiles, and Fishes, which are provided with a bony frame and red blood, still they are entirely analogous to them in regard to many of their physical functions, in nervous *Sensation* and *Perception*, in regard to *Respiration*, which is effected by respiratory organs, or air-holes placed on the hind body, and in regard to *Nutrition*, which is effected through a stomach and intestines.

Insects are found in the air, as, for instance, Butterflies; or in the water, as the whirling Water-beetle; or in the ground, as the Centipede; or on plants, as the Caterpillars; or upon the body of animals, as Ticks and other Spongers.

There is scarcely a plant or an animal which is not the dwelling of some Insect. Hence the number of Insects must be immense, and without exaggeration, it may be said, that there are in existence more than a hundred thousand different species. If we adopt the general rule, that on an average, three species of Insects dwell on each species of plants, (and on some plants we find three or four times as many,) we can easily see that such an enormous number cannot prove too small an estimate, when we consider that there are now known between forty and fifty thousand species of plants.

The nourishment of Insects is as varied and different as that of larger animals. A great number of them are carnivorous, and prey upon other insects, as is represented in Plate I., or they feed on dirt, dead bodies, or decayed wood, as the dung-beetles, flies, ants, and the larvæ of the stag-beetle; or they feed on plants, as the may-beetle, plant-lice, &c.

In regard to the *venom* of Insects, we find a number of them provided with organs for biting or stinging, which occasion inflammatory tumors and poisoned wounds, which are oftentimes dangerous, and sometimes fatal to man, as, for instance, the sting of the scorpion, scolopendra; and even of bees, wasps, and musquitoes.

The faculty called *Instinct*, which belongs to all animals, and by which, from an internal impulse, and without instruction, they perform certain actions tending to their own support, or that of their offspring, is also found in Insects, as well as some faculties of the mind, which would astonish an observer. Thus, when the Tumble-beetle in vain tries to roll its little ball up a hill, it runs for assistance, and brings back with it two or three other ones who roll up the ball in concert with it, but as soon as they have succeeded, the assistants fly away, and the first one continues his work alone. Bees, Wasps, and Ants defend themselves with great courage, and woe to him who attacks a wasp's nest! Some flower-beetles, like opossums, pretend to

be dead when you catch them, or at your approach conceal themselves behind a leaf, or fall to the ground as if dead. Some have even memory, and know perfectly well the one who takes care of them, as, for instance, the Bees. The nests and dwellings of many Insects often surpass those of birds in the skill displayed in their construction, &c., as the vespiaries, or artificial dwellings of Wasps, or the tents of the Tent-caterpillar, or the variously constructed cocoons of Butterflies. But we cannot enlarge more upon these qualities, as they will be mentioned in the descriptions of the different Insects.

According to the improved, ingenious arrangement of Linnæus, Insects are divided into the following eight orders, viz.:

- I. *Coleoptera*. Beetles or Chafers. All Insects with horny bodies, six legs, and four wings, of which the upper ones are horny, and the lower ones parchment-like, as the Stag-beetle, May-beetle, &c.
- II. *Hemiptera*. Bugs, all Insects with four parchment-like wings, six legs, and who obtain their nourishment by sucking with a moveable proboscis, as, the Cicadas, Plant-lice, Bed-bugs, &c.
- III. *Orthoptera*. Olivier Insects with four parchment like wings, of which the upper ones overlap on the back, and the two under ones are thin and folded together like a fan. They differ from those of the preceding order in that they have strong jaws instead of a moveable proboscis, as, e. g., the Grasshopper, Cricket, and many others.

- IV. *Lepidoptera*. Butterflies are Insects with four expanded wings, covered with coloured farinaceous scales.
- V. *Neuroptera*. Net-winged Insects are those which have four transparent, net-woven, or latticed-like wings, as the Dragon-fly, &c.
- VI. *Hymenoptera*. Vein-winged Insects, with four transparent, veined wings, and generally provided with a venomous sting, as Bees, Wasps, &c.
- VII. *Diptera*. Two-winged Insects, as Flies and Mosquitoes.
- VIII. *Aptera*. Wingless Insects, as Ticks, Lice, &c.



BEETLES—*Continued*.

Having now laid down the general divisions of Entomology, and the arrangement I intend pursuing in the following pages, it remains to continue the Natural History of Coleopterous Insects which we have already commenced.

But, before speaking of the Insects themselves, I cannot omit a passing tribute of gratitude to the ingenious friend through whose valuable aid I have been enabled to spread them out before my readers in all their lifelike attire. Most of the Insects presented in this and the succeeding Plate, and many that will appear hereafter, have been originally drawn and painted from nature by my friend, Washington Hoppin, M.D., of this city, who, although an amateur, only relieving the monotony of professional life by an occasional dis-

play of this his native talent, has nevertheless drawn and painted these specimens from my cabinet with the skill of the most experienced professional artist; and this he has done from the disinterested purpose of aiding me in rendering more valuable and popular this important department of Natural History. In return for his kindness, I beg to offer him here my sincere thanks, assuring him that I take great pleasure in associating with this work the name of Hoppin—a name not undistinguished in the annals of American Art.

We have already remarked, in the lives of the Insects under consideration, that they afford a constant evidence of the working of Nature's great law of Antagonization,—the one undoing what the other does; the injuries which one species would inflict upon man are checked by other species, which prevent their superabundance, and keep an even balance in the scale of being. It is with the insect world as with the political, religious, and social worlds. One political party is constantly exercising a conservative restraint upon the other. The controversies of the different religious sects tend to preserve a healthy balance between morbid superstition and unrestrained licentiousness, between a tyrannical domination over the consciences of men, and a wild, illiterate paganism. The fanatic abolitionist may imprecate the curse of Heaven upon a slaveholding State, and, if unrestrained, might involve his

country in anarchy and civil war; but his calmer opponent will check him in his mad career by pointing to the massacre of St. Domingo, and the present deplorable condition of Jamaica, both the result of a premature emancipation.

Hence, this law of Antagonization is, in its effects, the law of Compensation. Thus, we see Tiger-beetles, Carabi, Lady-birds, and many other Coleoptera, destined to benefit mankind by devouring other insects which are noxious. Of these we have already spoken. But a mere negative usefulness is not the only one belonging to this order. There are also many other Beetles which render us the greatest service by devouring putrid substances, carrion, decomposed fermenting plants, mushrooms, dung, and decayed wood, as, for instance, the Dung-beetles, Carrion-beetles, and many others.

Now the food of Beetles in general has suggested to us the idea of dividing them into three Natural Families, according to the nourishment which they subsist upon, and this division seems to us the simplest, most uniform, and the most rational, as well as the only really natural division. Accordingly, I classify all the Coleoptera under one of the three following families:

- 1st. The Carnivorous Beetles, which, like Lions and Tigers among Beasts, prey upon living Insects; as those presented in the first Plate.
- 2d Scavenger Beetles, which live on putrid matter, carrion, de-

cayed wood, and plants ; as those represented in the second Plate.

- 3d. Herbivorous Beetles, which feed on Plants and Fruits, as Snout-beetles, or Weesils, Capricorn-beetles, &c.

The first two families are useful to man, and deserve our protection, but the last are noxious, and should be destroyed wherever encountered.

The distinguished French Entomologist, Latreille, divided Beetles into five tribes, according to the number of joints found on their feet. Thus, he called those that have five joints, *Pentamera* ; those with four on the hind feet and five on the fore feet, *Heteromera* ; those with four, *Tetramera* ; with three, *Trimeria* ; and those with two joints, *Dimeria*.

This division, although as convenient as the artificial classification of Plants by Linnæus, according to the number of stamens, is still subject to the same incongruities. Both in the system of Latreille and in that of Linnæus, we find arranged in one and the same class individuals which do not and cannot coincide with each other, neither in their external form nor in their nature. Thus, in the Linnæan system, the Crocus and Wheat occur in the same class, Triandria, simply because each of these plants has three stamens ; but what an immense difference is there between them, in their properties, and even in their external forms ! Many others occur in the same class, which are equally incongruous. So

also in the artificial system of Latreille. The Tiger-beetles and the May-beetles belong to one and the same family, which he calls Pentamera, because both have five joints on their feet; but they are very unlike each other in their forms and in their natural disposition; the one is carnivorous, the other herbivorous; the one is useful, the other injurious to vegetation. For these reasons we prefer our natural classification according to their food, and hence according to their natural disposition. Of the first family, the Carnivorous Beetles, we have already spoken, and we proceed to the second family.

Scavenger Beetles.

The body of most all of the Scavenger Beetles is very hard, and their feet very strong, adapted for digging. They deposit their eggs in manure, or rotten wood, or carrion, or in the ground, and, in some instances, the grubs (larvæ) proceeding from these eggs live several years in these substances before they are metamorphosed into perfect beetles, as in the case with the Stag-beetle.

In this family we find the largest Beetles, as, for instance, the Hercules of South America, which is five inches long. Many of them also are remarkable for their very singular forms. Upon their thorax or head we generally notice several horns, which are used to

facilitate the process of digging, and the antennæ in many of them terminate in a knob, which consists of from three to seven leafy pieces (lamellæ), which they fold or unfold at pleasure, like a fan. These last are on this account called *Lamellicornes*.

Notwithstanding some of these Insects dwell in the most disgusting and filthy abodes, from which also they take their nourishment, they are still very clean in their appearance, and generally very bright in their colour. Their olfactory organs are very powerful and of great extent, for scarcely a horse or cow drops its dung in a pasture, but we see them flying to it from all directions, digging themselves into it, working it up, and making holes under it in the ground, into which they deposit their eggs, or making balls of it like the Tumble-bug.

The larvæ of these Insects live under ground, and feed on the parts of their dwellings, viz., on manure, decayed wood or carrion, or roots. They are of a cylindrical form, somewhat thicker behind, and round, and consist of twelve generally pale yellow coloured ringlets: their head is horny, they have two strong jaws and six legs. On each side of the body are the breathing organs, consisting of nine holes, the same as in Caterpillars. Their back is generally curved, and hence they cannot stretch themselves out, or walk upon level ground. Many of them live in this seemingly pitiful condition for several years before they change

into a cocoon (puppa); then, with the material of their dwellings, which they anoint with a gelatinous substance, coming from their bodies, they form an oblong cocoon, into which they gather themselves, and remain safe from all external influences, until after a longer or shorter time their metamorphosis is complete, and they emerge as perfect Beetles.

A number of such larvæ were considered by the ancient Romans as a wholesome and delicious article of food, and even fried and eaten by them, in the same manner as the inhabitants of the West India Islands now do with the Palm-worm, which is a disgusting-looking, fat larva, from three to five inches long. This larva lives in the stem of the Palm-tree, usually in the Cabbage Palm (*Areca Oleracea*), and afterwards changes into a black Weevil, two inches long (*Calandra Palmarum*, which will be illustrated in the next number), which, however, belongs to the herbivorous Beetles, of which we shall speak hereafter.

The gigantic beetles of this family, some of which are from three to five inches long, are found in the tropics of America, Asia, and Africa, and, from their size and magnificent colours, as well as from the oddity of their appearance in contrast with those of other climes, form great ornaments in an Entomological cabinet. They are as rare in the Insect world as are the Elephants, Rhinoceroses, and River-Horses among

beasts; and enthusiastic Entomologists have often paid very considerable sums of money for them.

It is not wonderful, then, that these beautiful ornaments of Creation have so excited the admiration of scientific men as to lead to a complete mania for collecting and preserving them;—as actually to make the observation of Insects, and the study of their nature and use, the ruling passion of their lives. The immortal Reaumur established on his estate, houses, or rather nurseries, for Insects, and paid servants for attending to them, he himself watching them night and day, in order to become perfectly acquainted with their manner of living. His "*Mémoires des Insectes*," published in Paris, 1734, abound with the most curious and interesting observations.

General Count Déjeau, Aide-de-camp to Napoleon Bonaparte, was so anxious to increase the number of specimens in his entomological cabinet, that he even availed himself of his military campaigns for this purpose, and was continually occupied in collecting Insects, and fastening them with pins on the outside of his hat, which was always covered with them. The Emperor, as well as the whole army, were accustomed to see General Déjeau's head thus singularly ornamented even when in battle. But the departed spirits of those murdered Insects once had their revenge on him; for, in the battle of Wagram, in 1809, and while he

Plate II.

Fig. 10.



Fig. 6.



Fig. 7.



Fig. 9.



Fig. 8.



was at the side of Napoleon, a shot from the enemy struck Déjeau's head, and precipitated him senseless from his horse. Soon, however, recovering from the shock, and being asked by the Emperor if he was still alive, he answered, "I am not dead; but, alas! my insects are all gone!" for his hat was literally torn to pieces. Six years after this, in 1815, I met Count Déjeau at Fiume, on the Adriatic, and made several entomological excursions with him.

The celebrated Prince Paul of Würtemberg, another passionate Naturalist, whom I met in 1829 at Port-au-Prince, being one day at my house, shed tears of envy when I showed him the gigantic beetle *Actæon*, which, only a short time before, had been presented to me by the Haïtien Admiral Banajotti, he having found it at the foot of a Cocoanut Palm-tree on his plantation.

Some months ago, it was falsely stated by several of our leading papers that Prince Paul had been converted to the Catholic faith, and had died in Paris. Now, as on account of his profound learning and adventurous travels he has gained a world-wide notoriety, and as I am intimately acquainted with his whole history, it is no more than right that I should correct these misstatements, even at the risk of being thought too discursive.

The Duke Paul of Würtemberg, cousin of the present Emperor Nicholas of Russia, as also of the present

King of Würtemberg, pursued his studies at the University of Heidelberg, where he made rapid progress in every branch of science, but particularly so in the study of Zoology, Comparative Anatomy, and Botany, and where he received the degree of "Doctor Medicinæ et Chirurgiæ." In the battle of Waterloo, 1815, he was seen commanding a Prussian regiment of cavalry, as their Colonel; and after peace was restored, he married the handsome young Princess of Thurn and Taxis. But as this union, on account of pecuniary and family difficulties, proved very unhappy, the Prince twice left Europe for North and South America, travelling several years under the assumed name of Baron Hohenberg, and gratifying his taste in making valuable botanical and entomological collections. During all this time he lived on his small royal appanage, consisting of about \$5,000 per annum.

During our frequent natur-historical excursions in the interior of St. Domingo, he often spoke of his prospect of being elected King of Greece, for which office he was a candidate, and of which he felt entirely certain; but when he afterwards learned that the Emperors of Russia and Austria had rejected him, considering him a second Philip Egalité, on account of his radical principles, he became very low-spirited and even melancholy. So great however was his passion for Entomological specimens, that a collection of one hundred

species of splendid Insects, made in one day, for ever expelled all thoughts of the Grecian royal crown from his mind, and restored his former cheerfulness. Prince Paul is now travelling in Australia, and has neither become a Catholic, nor did he die in Paris several months ago as was misrepresented.

The Bronze Dung-Beetle, (Coprís Carnifex.)

Plate I. Fig. 6.

This is one of the most splendid Scavenger-beetles of North America, and is found in horse and cow dung on our roads, and in our meadows and pastures. It is about three-quarters of an inch long, and has a short, vaulted body without a scutel, that is, without that little triangular horny plate between the upper parts of the two ring-covers, which we find in so many others, for instance, in the *Cetonia*, Plate II., Fig. 8 and 9. Its antennæ are short, and terminate in a knob composed of leaf-like pieces, which can be folded or unfolded like a fan, at the pleasure of the animal. The thorax and head are externally chased, and of an antique bronze colour. The head is semi-circular, with a purple border on the margin, and in the male with a short perpendicular horn. The wing-covers are striated, and of a changeable green colour. The feet black, hairy, and strong, calculated for digging holes.

This Beetle, like all others of this family, contri-

butes much towards purifying the air, by feeding on putrid, unwholesome substances. It acts in the same manner, and produces the same effect, as those larvæ of Insects which live in the water, and purify it. The experiment of Linnæus is perhaps familiar to all. He filled two vessels with fetid, putrid water, and into one he put the larvæ of Gnats, Dragon-flies, and Ephemerae, and left the other standing. In a short time the water in the first vessel, which was full of larvæ, was found pure, and entirely devoid of smell, while the other continued as fetid and as putrid as before. This experiment can be repeated to the satisfaction of every one who chooses to make it.

The Bronze Dung-beetle is found in great numbers during the latter part of summer and in the autumn, more in the Southern and Western States than in the North and East, and for the very obvious reason that its presence is more wanted in the warmer climates, where the air is more apt to become infected by decayed and putrid matter.

Another use may be made of this Insect, and one which I may mention particularly for the young ladies and gentlemen who may read these pages. By taking off its handsome wing-covers, thorax, and head, and glueing them close to each other on the outside of a fancy box, you will have a beautifully variegated surface, glistening with green and red, which will

shine brilliantly when varnished and will excite the curiosity of every one. If you cannot find wing-covers enough of this Insect, take those also of Tiger-beetles, Lady-bugs, Carabi, Cetonias, and a hundred others with bright colours, and you will have a variety of colours such as Nature only can paint, and such as cannot fail to captivate the eye of every observer, or to reward you for your trouble. Such occupation would form a delightful amusement for the long winter-evenings; and while storms and snows are raging without, what more genial employment than to be admiring the creatures of a sunny clime and studying the character and uses of these spangled ornaments of Nature's tropical dress!

Now, in order to accomplish this, you must amuse yourselves during the summer by catching Beetles and preserving them. You will find hundreds of them running in the roads, or concealed under stones, or sitting on the leaves of plants, or flying in the air. If you keep your windows open during the warm nights also, those insects which are active only at night will fly into the room towards the light, and may thus be taken by the hand, for none of the Beetles are venomous. But in order to preserve them and make them die as quick as possible, you must be provided with a wide-mouthed bottle, (a horse-radish vial answers this purpose very well,) con-

taining a small quantity of whiskey or dilute alcohol, and put them into it as soon as caught. When they are dead take them out, and stick a long pin or needle through the right wing and body, so far that their legs cannot touch the bottom, and then place them in a box the bottom of which is lined with beeswax or cork. In order to prevent the entrance of destructive living insects, it is also necessary to stick a pin in each corner of the box with a piece of sponge on it, which you must from time to time saturate with spirits of camphor. Beetles may be also kept in a vial of whiskey or alcohol, and thus be preserved for many years, and transported thousands of miles without injury. I have been thus particular in these details, because I am often asked how to catch and preserve these insects.

Another species of Dung-beetle, very beneficial in the same way, and well known to every child, is the funny Tumble-bug, or *Pellet-beetle* (*Ateuchus volvens*), which is found in all the States of the Union, and in fact similar ones are found in all parts of the world. Pliny, speaking of that species which is found in Italy, says: "Aliud scarabæorum genus, qui e fimo ingentes pilos aversis pedibus volant, parvosque in iis contra rigorem hiemis vermiculos foetus sui nidulantur."

The Pellet-beetle of North America is half an

inch long, of a black, and some of them of a changeable green or purple, colour, exhaling a fetid odour, slightly resembling that of musk. These Beetles are complete models of industry and parental care, for they are continually occupied in making small balls of fresh manure, about the size of a common marble, which they mix with earth, and into which they deposit an egg. As soon as the ball is dry, they roll it and roll it until they find a convenient place for making a hole two or three feet deep, into which they roll it, and then bury up their offspring, the precious object of so much care.

The ancient Egyptians were so convinced of the benefit derived from these insects, that they considered Pellet-beetles as sacred, and usually represented them in their temples, obelisks, and statues. They are also found even in their mummeries. The *Ateuchus* sacer of the Egyptians, however, although of the same character and habits as our Pellet-beetle, is twice as large, and is also black. It is found not only in Egypt, I saw it also in France, Italy, the Crimea, and along the Caucasus.

We come now to a species of Insects which are in rather bad repute among farmers, because they feed on decayed wood, and because some of them deposit their eggs in the crevices of the bark of many trees. I do not here speak of the destructive

Wood-borers or Weevils, but only of those insects which feed on decayed or rotten wood; and if our farmers call these creatures wood-destroyers, I think the Beetles may with more propriety apply the epithet to the farmers themselves, who really destroy an immense amount of timber unnecessarily, and even hire men to help them do so. I allude to the common practice of enclosing our lands with expensive wood fences, which indeed may be necessary in a newly settled country, like the far West, but which are not at all necessary in our old, well-cultivated States.

I am aware that this subject has been somewhat agitated of late among agriculturists, and I trust these remarks may reach the ears of some who will be convinced, with me, that the practice of laying out whole farms with these expensive enclosures, is a wasteful, extravagant throwing away of wood. I believe it to be a fact, that if our country had not been wonderfully favoured with inexhaustible coal-mines, our woodlands would long ago have been deprived of their trees, and fuel would have to be sold by the pound. Now our farmers not only incur the expense of timber and manual labour in building these wooden fences, but they must be at the additional expense of repairing them every year, and if all this were entirely avoided they would actually realize more benefit from their estates. It is true, that if there are no fences in the country, the

cattle must stay at home, lest they injure the fields and meadows, and that every farmer on this continent would be obliged to resort to stall-feeding, and keep his cows, oxen, hogs, &c., in the barnyards. But by doing so he will be the gainer, for he will save, first, his timber; second, the wages for making his fences; third, his cows, by being kept at home, will produce more milk, butter and cheese; fourth, he will save a large amount of manure, which he loses if his cattle are allowed to ramble in the woods and pastures; and, lastly, by having no enclosures, except around his garden and orchards, (and hedges are even here far better than fences,) he will beautify his whole estate and country by depriving it of that confined and prison-like appearance which wood fences and stone walls necessarily give it.

It is a very difficult matter to eradicate inveterate superstitions, and it is equally hard to break up old habits. Notwithstanding the plough has been used from time almost immemorial, the inhabitants of St. Domingo have not yet adopted it, but still prefer the hoe and spade, and to hoe and plant an acre of Indian corn is there the work of four weeks for one man. But "a word to the wise should be sufficient."

With regard to wood-destroying insects in general, it must be remarked, that they are of the greatest importance in the tropics, as well as in those unin-

habited countries where many hundred miles are often covered with impenetrable forests, where hurricanes, tempests and earthquakes break down gigantic trees, which if left alone would not decay for years, but which are reduced to dust in a short time by wood-eating insects, and a new and vigorous vegetation springs up from the soil made fertile by that dust. This phenomenon may be observed to a certain extent even in our own woods

One of these Beetles, which in company with its offspring feeds on rotten wood, is

The Horned Passalus. (Passalus cornutus.)

Plate II. Fig. 7.

This Beetle is about $1\frac{1}{4}$ inches long. It is black, and has a slender body. Its antennæ are rather more denticulated than those of the Lamellicorn. Its head is very short, but provided with a curved horn, two lines in length. It has two very short, pincher-like jaws, a bright, vaulted thorax, with an intermediate line, wing-covers striated and very bright, and six short legs, covered with brown hair. It lives in the trunks of decayed trees, and is found in all parts of our country, from New England to Mexico and the West India Islands. Nearly allied to this Insect, and very much resembling it in many respects, is

The Stag-Beetle. (Lucanus Dama.)

This is an Insect known to almost everybody. It is an inch and a half long, of a chestnut colour, with prominent pincher-like jaws, which, however, in the female, are very short, and not larger than those of the Horned Passalus. Its legs are quite long, and terminate in two sharp claws.

They are called Stag-beetles on account of their pronged jaws, similar to the horns of stags. They live principally upon oak trees, and lick the dew from the trees, as well as the sweet brown juice which oozes out from the stem of oak trees, and if you put honey on the point of a knife they will follow after it, as a dog will follow a piece of meat. They may be seen flying around these trees towards night in the months of July and August.

These Beetles are well known to our youth, and attract their attention by their singular form, but particularly by their prominent jaws, with which they pinch very hard. Wood-cutters often bring them home as playthings for their children, for which present, however, the little fellows sometimes have to pay with their tears. In some countries the boys make tiny wagons, which they load with cherries or raspberries, and to which, for their amusement, they harness these Beetles, making them as beasts of draught.

In the month of June or July, according to the temperature of the country, the Stag-beetle deposits in decayed oak wood her eggs, which are oval and yellow, the larvæ proceeding from which live from four to six years before they become perfect. When full grown, they are three inches long, thick, of a straw colour, with a yellow head, brown jaws, and nine air-holes on each side of the body.

Two years ago I removed the post of my garden gate, which was of oak and had become decayed, and found around it, below the surface of the ground, more than thirty of these grubs, which I put in a vessel with the same decayed wood, but they died during the winter.

The Stag-beetle of Europe is of the same form and colour, but more than as large again, and is therefore the largest Beetle of Europe.

The Cossus (grubs), which the ancient Romans considered so great a delicacy, were taken by them from oak trees and were probably the same species. Pliny says, "*Praegrandes roborum delicatiores sunt in cibo: Cossos vocant.*"

The larva of the Stag-beetle, when full grown, prepares from the earth its cocoon, which is of an oval form, and in which it remains about four weeks, after which time it emerges as a perfect insect. These Beetles are found in all the States of the Union.

The Indian Cetonia. (Cetonia Inda.)

One of the earliest Beetles which the wandering naturalist meets on his exploring expeditions is the pretty Indian Cetonia. Tab. II. Fig. 3. These little creatures, clad in a modest copper-brown dress, and covered with short hairs, are seen in the months of April and May flying like bumble-bees for short distances only and then alighting in the sand. Their beauty and their early appearance very generally awaken the pleasant anticipations of a tropical temperature.

Several years ago I made an excursion on the first day of May with a young gentleman from Germany, an enthusiastic amateur in Entomology and Natural History generally, like most of the students of the Old Country. All at once he stopped, bent down to the ground and picked up one of these little Cetonias, and, holding it up in his hand, he exclaimed in ecstasy, as if addressing the dearest object of his heart:

“Der erste Tag im Monat May
Ist mir der glücklichste von allen,
Dich sah ich, und gestand dir frei
Am ersten Tag im Monat May,
Dass dir mein Herz gewogen sei.
Hat mein Geständniss dir gefallen,
So ist der erste Tag im Monat May,
Für mich der glücklichste von allen.”

Which translated reads: "The first day of the month of May is the happiest day of all to me. 'Twas on that day I first beheld thee and my heart confessed me thine. If my confession pleases thee, then ever will the first day of the month of May be the happiest of all the days to me."

This little Insect is about half an inch long, and feeds upon the pollen of the stamens of flowers—it sucks also the sap of trees, principally that of willows, and deposits its eggs at the side of roads, or in places where garden weeds are heaped up, and in decayed wood. Its larvæ feed on different kinds of roots. Reasoning from analogy with the nature of other species of *Cetonia*, I should conclude that the larvæ of this Flower-beetle continue in that condition upwards of three years before they become perfect Beetles.

The *Fox-like Cetonia*, *Amphicoma vulpina*, (Tab. II. Fig. 9,) is also a native of North America. It is of about the same size as the Indian *Cetonia*, but more slender, and covered all over with long reddish hair, resembling a fox.

Another Insect belonging to the family of Scavenger Beetles is the horned *Fungus Eater*, *Boletophagus cornutus*, which feeds not only on decayed fungus and mushrooms, but also on decayed wood. The male and female species of this Insect I have

lately received from my esteemed friend, David Smith, M. D., of Providence, from whose Entomological researches I have obtained many interesting facts, and to whose kindness I am indebted for the free use of his valuable library.

This Insect is represented by the late Thomas Say, in his American Entomology, Plate 51, without, however, making any mention of its habits, use, or injury.

The Fungus Eater is about half an inch long, and is remarkable for its singular form. Its head has two little horns upon its margin, which are curved backwards and inwards, resembling that of a Babyrussa. Its thorax has two larger horns, which are curved and directed forward, looking like a bull's head, and its wing-covers are surmounted by so many tubercles that their whole appearance is like that of a Turkish country-metschet or mosque, covered with a number of small minarets or spires.

The body of this animal is of a dark ash-colour and hairy, and it lives principally in fungi and in decayed wood.

Another, and a very important class of Insects, belonging to this family, are the *Carrion Beetles*, which feed on dead or dried animal bodies, of the higher as well as the lower classes. They eat the flesh, fat, skin and intestines of dead beasts, birds, fishes, and the internal parts of preserved insects. Hence we see very

few of them, for they bore into those bodies and conceal themselves in them, devouring their decayed parts, and depositing their eggs in them. Those who will dare encounter fetid exhalations and will take the trouble to examine the putrid cadavers of horses or cows, or any other dead animal that is left exposed to the air, will find a very large company of Carrion-beetles, of different genera and species, in a variety of different uniforms; some looking like martial officers, ornamented with one or two golden epaulettes; others, like chamberlains of a despotic sovereign, ornamented with a golden royal chamber-key on their side; others in ordinary working dress, and altogether quite respectable and corpulent in their appearance, because they, like the persons they so much resemble, live also on the fat of their fellow-creatures.

Now, the greatest part of these Beetles, as I have already mentioned, are very beneficial to man, by consuming carrion and all decomposing substances. But there is one particular genus of them against which the naturalist always makes war, notwithstanding it is not larger than two-thirds of a line. This small Insect is called the Cabinet-beetle (*Anthrenus Musæorum*), and is of a dark brown colour, covered with gray scales forming three stripes across the wing-covers. If these scales are wiped off, the Insect appears black, and loses its specific character.

In spite of its diminutive size, this insect is a great plague to all cabinets of Natural History, and if they are not well protected against it, they will all be destroyed by it in a short time, for its larvæ are able to make holes through the hardest boards, and will make their way unperceived into any case whatever. They eat the skins of stuffed animals, and particularly the internal parts of insects, of which they leave nothing but the wings. Thus the most precious and costly collections will be entirely destroyed by it, if the necessary precautions are not taken to prevent it.

The late General Andrew Jackson, President of the United States, presented me, in 1834, with two large boxes of splendid South American Beetles and Butterflies, but, much to my regret, on opening them I found the largest and handsomest specimens destroyed by this little enemy of Naturalists. I succeeded, however, in saving a large number of them from entire destruction, by putting them into alcohol, and by making artificial heads and bodies out of cork, and then painting them and fastening the wings to them with gum-arabic.

In order, therefore, to prevent your cases of Insects from being destroyed by this Cabinet-beetle, it is necessary to have the lining of the boxes, whether it be of cork or wax, well impregnated with spirits of turpentine, and besides this, it will be well to

fasten in each corner of the box a pin with a small piece of sponge attached to it, which may be saturated from time to time with the same fluid, or with spirits of camphor. The latter, however, cannot be used in cases which contain Butterflies, as the evaporation of camphor will make their colours fade. The cases themselves, as a matter of course, should be made as tight as possible, in order to prevent the entrance of any living insect.

The larva of the Cabinet-beetle is two lines in length, and has on each side of the body little bundles of reddish-brown hairs, which, when disturbed, it erects in the same manner as the Porcupine does its quills. These larvæ are sometimes seen upon our walls looking out for dead insects.

The *Carrion-beetles* (Silphæ) have a broad body, with a shield-like thorax, upon which is a declining head, with strong jaws, and with antennæ terminating in a knob. A great number of species are found everywhere in North America, among which are, for instance, the

- Silpha marginalis,
- “ inæqualis,
- “ Swrinamensis,
- “ Americana, etc.

but as the habits and character of one species are identical with all the others, the representation and description of one will serve for all the rest.

The *Crusader Carrion-beetle*, (*Silpha Americana*,) (Plate II., Fig. 10), is more than half an inch long, has a black head, yellow thorax, with a large black spot, resembling a cross, in the middle, somewhat like that on the coat of the ancient Crusaders, on which account I give it this name. It has dark brown chased wing-covers, and black legs. These Insects live together, in flocks of immense numbers, in the body of some carrion, where they feed together in the greatest harmony; and they may always be obtained with ease, provided one will put up with the fetid exhalations which surround them.

Another Insect belonging to this family of Scavenger Beetles, and one which has a similar appetite for decayed animal substances, is

The *Big Grave-digger*, (*Necrophorus grandis*,) of which there are also several species. This Beetle has a large black head, with antennæ terminating in an orange-coloured knob, a round black thorax, and orange-coloured truncated wing-covers, with an undulating black band crossing the middle of both wings. The habits of this animal are very curious and astonishing.

The dead body of a frog, mouse, bird, mole, snake, or toad, lying in a garden, field, or meadow, is immediately scented by these Grave-diggers, who run to it in great numbers in order to conceal it in the ground.

First they run around it, and examine it from all sides, as if they wished to measure its size; then they proceed to examine the ground to see if there are any stones in it which would prevent them from digging. Finally, after having selected a place well adapted for their purpose, they by their combined efforts move the carrion there, placing themselves under it, and by lifting it up with their head and thorax, they at the same time dig the earth away with their fore-feet, so that the carrion gradually sinks into the ground. From time to time, one or the other of the Beetles come out from beneath, as if to examine the position and progress of the dead body; then, creeping under it again, the work recommences in concert. After about three hours of hard labour, the body—for instance, that of a frog—is so far buried that it cannot be seen from the surface of the ground. They then continue their labours in this manner for several days, until the carrion is sunk about a foot in the ground, and this they do probably in order to prevent the Meat-fly from depositing her eggs upon it.

The female Grave-digger deposits in the carrion about thirty eggs, which are white, cylindrical, and have a short filament at each extremity. These are hatched in about two weeks, and the larvæ proceeding from them attain their full growth after four weeks more. At this period they quit the dead body, go

deeper into the ground, and form their cocoons, from which, after about four weeks, they issue as perfect Beetles.

The immortal Rösel, in his "Insecten Belustigung," (Amusements with Insects,) 1748—1761, has made some very interesting and profound observations with regard to this Insect, which all would be pleased to hear, but which our limits forbid us to relate.

We proceed, then, to the third natural family of the Coleoptera.

Herbivorous Beetles, or Plant-eaters.

The Herbivorous Beetles are all provided with a horny skin, and very hard wing-covers. Both as grubs and as perfect Beetles, they feed on vegetable substances. Some on green wood, as the Spring and Capricorn Beetles; some on fruit and seeds, as the different kinds of Weevils or Snout Beetles, and others on leaves, as the Cucumber Beetle.

As these Insects infringe the privileged prerogatives of Man, who, like every kingly despot, imagines that every living being in his dominion was created only for his sake—as they destroy the wood destined for our fences, fuel, and furniture—as they devour our cherries, pears, apples, plums, chestnuts, peas, rice, and wheat, and all our fruit—as they eat up the leaves of our garden, orchard, and fruit trees, they

are, and always have been, considered as the enemies of mankind. A universal war is carried on against them, and agricultural and horticultural journals are filled with receipts of different preparations, and directions for their destruction, like our newspapers with panaceas for consumption, rheumatism, and all other "ills which flesh is heir to."

But, after all, it has been the Entomologist, who by his indefatigable researches and observations has discovered their real benefit or injury, that has protected Man against them, and them against Man; it was he who looked for their abodes, learned their habits, character, mode of propagation, and duration of life; it was he who discovered their use or their injury, and taught mankind the use which can be made of the beneficial ones, and the only sure means of preventing the baleful ravages of the noxious ones. It is for this purpose that the Naturalist collects them, even the smallest Insects that live, preserves them in his cabinet, watches them with unwearied care and perseverance, and acquaints his fellow men with the results of his laborious researches.

Such a philosopher was, in ancient times, and I am sorry to add, is even now in modern times, too apt to be considered by the ignorant and money-loving, money-making mass of the people, as a trifling enthusiast, too lazy to work for his bread; and should

he sacrifice his time and his pecuniary means in these benevolent and truly philanthropic labours, he is without gratitude, or even sympathy, from those he most benefits, living only on the hope and the consciousness that future generations will reward the ingratitude of the present, instead of being, as he deserves, honoured for his self-denying devotion, loved as a friend, and recompensed as a benefactor. Such things may be excused in the ignorant; but why is it that in our so-called Halls of Learning so little attention is paid to the study of the objects of Nature, to their remarkable properties, and their wonderful organization, to the faculties which distinguish them from all others, to their reciprocal affinities and harmonies, and to the great chain which unites them all?

The fact that the study of Nature tends directly to the civilization of a nation, was well understood, more than a century and a half ago, by that ingenious, self-made man, Peter the Great, of Russia. He conceived the idea that a love for this department of science would contribute much towards the civilization and refinement of his barbarian subjects, and accordingly he established, at an enormous expense, a large museum of Natural History at St. Petersburg; and in order to induce his whiskey-loving subjects to go there, he ordered a glass of brandy to be presented to every visitor.

That Muscovite barbarian certainly exhibited more common sense than the Congressman in our modern time, to whom Wilson showed his work on American Ornithology, and who replied, "We do not at all want such books, for any one can see birds every day in our woods and orchards, without paying one penny for it," or that Reverend gentleman who was visiting the museum of the New Jersey College, at Princeton, in which I was then Professor, and who remarked to me "that he could not understand how the Rev. John Maclean, Vice President of that Institution, could be such an enthusiast for such useless articles, particularly for bugs and other vermin." Yet it is owing to the sound principles, prudent management, and even pecuniary sacrifices, of that excellent man, John Maclean, that the College of New Jersey is still now in honourable existence.

But to return to the Herbivorous Beetles. The first of which we shall speak, are the *Spring-beetles*, (Elater,) which are also called Skippers, or Snapping-bugs. They are distinguished from all others, by having an organ by means of which they are enabled, when laid on their backs, to spring up into the air and recover their standing posture, which they could not otherwise effect, as their legs are very short. This organ is on the under side of the thorax, between the fore-legs, directed towards the extremity of the

hind body, and ending in a point which is enclosed in a sheath while the animal is erect. When, therefore, this Insect is laid upon its back, it bends its thorax and head, and, at the other extremity, its hind body backwards towards the surface upon which it is laid, which motion causes its spring to fly out of its sheath, like the spring of a watch, and throws the Beetle perpendicularly up in the air a distance of several inches. If they do not succeed the first time in recovering their standing posture, they repeat the operation perseveringly until they do, oftentimes to the great amusement of the children, who catch them and lay them on their backs in their hands.

These Insects generally deposit their eggs in the crevices of the bark of decaying trees, where their larvæ live several years before they become perfect Beetles. A few of the smaller species, whose larvæ live in the ground and feed on roots, may become somewhat injurious to vegetation.

There are many species of Spring-beetles on this continent, which may be distinguished by their size, colour, and antennæ. The largest and handsomest in the United States is

The Velvet-spotted Spring-Beetle. (*Elatér oculatus.*)

Plate III. Fig. 11.

This Insect is about one and a half inches long, and slender: some species are longer, and others

shorter than this. Its head, like that of all its kindred species, is very small, and looks as if it were sunken in the thorax, which is large and composes about one-third of its whole body. It is of a light brownish colour, sprinkled here and there with white spots. It is called in Latin *oculatus*, or eyed, because each side of its thorax is ornamented with a large circular black spot, which looks like an eye. But as its eyes are in its head, like all the others, I have thought best to give it a more correct English name, and accordingly, from the resemblance of its spots to velvet, I call it the Velvet-spotted Spring-beetle.

This Beetle is seen in all the States of the Union, but more in the South than at the North. It is found mostly in the trunks of trees, where its larvæ also reside. The larvæ have flat bodies, of an orange colour, and they live several years in this condition before they become perfect Beetles.

The *Lightning Spring-beetle* (*Elater noctilucus*), (Plate III. Fig 12), is another species of the same genus, and has a far more appropriate Latin name, *noctilucus*, or night-illuminating, but its common name in English is the Cucujo. This Insect is nearly an inch and a half long, and half an inch wide. It has two yellow, elevated, corn-like spots upon each side of the thorax, which are the principal organs for emitting light, and which appear, when alive, like

two shining emeralds. But besides these spots, it also emits light from every segment of the under side of its hind body. This light the animal can produce at pleasure, and when there are eight or ten of them in one glass, it is strong enough to enable a person to read by it.

Some months since, a lady of this city presented me two of these living Lightning-beetles, which she had received from Cuba. I kept them in a glass, and exhibited them in a dark room to several of my friends, who were much astonished and delighted at being able to see to read by the light issuing from them. I nourished them with great care, feeding them with sugar, their favourite food, but they died in about ten days, and with their life disappeared also their light.

I feel peculiarly grateful to these little Insects, because during my excursions in St. Domingo they were frequently the means of saving my life. Often has dark night surrounded me in the midst of a desert forest, or on the mountains, when these little animals were my only guide, and by their welcome light I have discovered a path for my horse which has led me safely on my journey. Often have I felt grateful to a wise Providence for the creation of these little night-illuminators, when all the lamps of heaven were shrouded with impenetrable darkness, and when, but

for their light-giving presence, I should have wandered for hours in a dreary forest, or been precipitated from a mountain ridge down a fathomless abyss. Thrice often have I been convinced that no object of Nature was created without being designed for some important use, and many, many times, in my wanderings, have I exclaimed with Southey,

“Sorrowing we beheld
The night come on : but soon did night display
More wonders than it veil'd : innumerable tribes
From the wood-cover swarmed, and darkness made
Their beauties visible ; awhile they streamed
A bright blue radiance upon flowers that closed
Their gorgeous colours from the eye of day ;
Then motionless and dark, eluded search,
Self-shrouded : and anon, starring the sky,
Ròse like a shower of fire.”

These Lightning-beetles are found in all the West India Islands, in Mexico, and Texas, and how far north they are seen I cannot exactly ascertain, but several species of them, possessing the same luminous qualities, are found in the tropics of America.

Their light is emitted from a phosphorescent substance, which forms one of the constituent ingredients of their bodies, and which they can exhibit or not, at pleasure. With this substance this species of Beetle act very much in the same manner as the Chameleon and other Lizards do with the fluids of their body,

by means of which they change their colour as often and as rapidly as they wish. That this phosphorescent substance is an ingredient of their bodies may be determined by mashing them, even after death, when it will be found that the same light is emitted as during life, and if rubbed against any rough surface, a streak of light will be produced resembling that of burning phosphorus.

Whether this light is given to this animal for the purpose of pointing out its way in the dark, or for enabling it to find its companions in the night, or perhaps, by inspiring fear, to serve as a defensive weapon against its nocturnal enemies, cannot be exactly determined. It is certain, however, that this light has often frightened ignorant people, who were wholly unacquainted with the objects of Nature, and who have actually taken these Insects for ghostly spectres or the spirits of their departed friends. How many like absurdities would be banished from the common mind, were the study of Natural History more popular, and more universally pursued! Why will the young of this generation be content to look at Nature "as through a glass darkly," when properly directed study might remove the scales from their eyes, and enable them to see the light radiating from a thousand points hitherto enshrouded with the mists and shadows of ignorance and superstition!

The grubs of the Lightning Spring-beetle, like most of this family, are injurious to vegetation, living in sugar-cane and trees, and converting them into saw-dust. But not less destructive are the innumerable tribe of

Capricorn-Beetles, or Long-Horned Beetles.
(Cerambycinæ.)

These Beetles are so called on account of their long feelers (antennæ), which resemble those of a mountain goat, and which, in some species, are longer than their body. They may also be recognised by their hard, horny skin, and by the four joints on each foot.

Their body is cylindrical; their head short, broad, and bent downwards, provided with strong jaws, as also with long bristle-shaped antennæ; their thorax is generally cylindrical, but, in some species, flat, and armed with thorns on both sides; it emits a sound which is effected by friction, that is, by moving it continually up and down, like a person rocking in a rocking-chair. On this account the Germans call them "fiddlers."

These Beetles, particularly those of the Southern States, and of the tropics, are very handsome, and usually attract a good deal of attention by their elegant forms and fine colours. But their grubs are

ugly, and none of them of a handsome colour. They live always under the bark, or in the interior of the trunks of trees, where they dig serpentine passages, converting the wood into a mealy dust with which they stop up the entrance to their abode. Here they live, feeding continually on the green wood, for two or three years, until they are ready to metamorphose themselves into cocoons, from which they afterwards issue as perfect Beetles.

The numerous species of Capricorn-beetles differ from one another in colour, in the length of their antennæ, and also in respect to their size. The *Clytus pictus*, for instance, (Plate III. Fig. 13,) is a North American species, and is only a few lines long, while the *Prionus Hayesii*, a Capricorn-beetle of Western Africa, is nearly five inches long, and one inch broad. Its antennæ measure seven inches, and its legs are four inches long. This gigantic Insect is of a dark brown colour, and has many thorns upon the thorax.

The Painted Capricorn. (Clytus pictus.)

Plate III. Fig. 13.

This beautiful Insect is one of our autumnal visitors, and one of the countless host of evidences that the rolling year is full, only as every season brings its own peculiar charms. Spring is the time of youth, of buds, and of flowers; autumn, the harvest of

maturity, of blossoms, and of fruit. If the merry month of May adorns our woods and meadows with their youthful vegetation, their chirping birds and delicate flowers, so is the beginning of autumn none the less lavish in its golden harvest of grain, its melodious songsters, and its crown of brilliant flowers. There, from the red-leaved bushes, the tall Rud-beckia peeps out its golden head; here, the blue Vernonia and Liatris mingle with the yellow Helianthus and Coreopsis, forming showy figures upon the green velvet carpet of the field; while the purple and white Eupatoriums, blending with the rosy Spireas and crimson Cardinal-flowers, and all, bordered by the variegated Asters and perfumed Golden-rod, form one magic sheet of kaliedoscopic images!

It is upon the slender Golden-rod, feasting upon the pollen of its flowers and upon its aromatic leaves, that we see the handsome little *Painted Capricorn-beetle*. This Insect is little more than half an inch long, and of a cylindrical form. Its whole body is black, and looks like velvet. Its head and thorax are crossed with yellow lines, and its wing-covers are marked with lines, triangles, and spots of the same colour. Its antennæ are half as long as its body, and its legs of a reddish brown colour.

Although this Beetle is seen in the month of September feeding upon the flower-dust of the Golden-

Fig. 12.



Fig. 11.



Fig. 10.



Fig. 14.



Fig. 13.



Fig. 15.



rod, its children have a different taste. Hence the female deposits her eggs in the crevices of the bark of Locust trees, and the grubs issuing from them immediately bore holes into the trunks of these trees, making winding passages through them, and feeding exclusively on the wood and pith. These Insects continue in the condition of grubs only about a year, they being metamorphosed into perfect Beetles in the following September, but while in this transition state they are very active, and the destruction of Locust trees by them is very considerable.

Dr. Harris, of Cambridge, in his Report on the injurious Insects of Massachusetts, speaks of this Beetle particularly, and the late Thomas Say, in his American Entomology, Table 53, represents four new species, which he calls *Clytus speciosus*, *C. hamatus*, *C. undulatus*, and *C. Caprea*.

We have now comparatively little to fear from the ravages of noxious Insects, since our prudent Legislatures have enacted laws for the protection of Birds, the great destroyers of Insects, and it is probably on this account, alone, that many species of Insects injurious to vegetation have almost entirely disappeared. In my travels through several States I have not, for the last two years, met with any of the Rose-bugs (*Macrodactylus subspinosus*), so destructive to every flower, nor with any of the Spotted Rutela

(*Rutela punctata*), so injurious to the Grape-vine. Even the May-beetles (*Melolontha quercicula*) are not seen in such abundance as in previous years, and should the laws for the protection of Birds be much more strenuous, I fear our poor Entomologists will be entirely thrown out of employment. It is a matter of congratulation, however, that our favourite Birds are so well protected by the laws of our State, and by the general consent of the people. They are more to be admired, even for their beauty, than most of our noxious Insects, and certainly reward us by saving our trees and shrubs, and by furnishing us a wholesome and palatable article of food. I had the pleasure of spending a week last summer at Bristol, R. I., at the residence of my esteemed friend, Mr. Dimon, the present Governor of Rhode Island, whose acquaintance I made twenty-five years ago in Port-au-Prince, when he was United States Consul for the Republic of Hayti, and I was delighted to see the robins and thrashers in whole families playing round me on the piazza like domestic pigeons, perfectly free and unmolested, building their nests and flying among the branches of the majestic trees which shade his residence. Such care and protection of animals throws an air of enchantment round the family mansion, and renders it not merely the residence of two or three isolated beings, but the centre of happiness to all

that come within its range. The home of birds and of flowers, must also be the home of gentle hearts, the circle of kindness and affection.

The Cloak-bearing Capricorn. (Desmocerus palliatus.)

Plate III. Fig. 14.

Is another Beetle of the same family. It is about one inch long, and of a changeable blue colour, except the upper part of the wing-covers, which is of a pale orange colour, and gives the animal the appearance of one carrying a cloak across his shoulders. Hence its name. Its antennæ are a little longer than half the length of its body. This Insect may be found upon the common Elder, and its grubs in the stems of the same shrub.

The largest Capricorn of the southern parts of North America is the *Stag-beetle Capricorn* (*Prionus cervicoruis*), which is three inches and a half long, of a brown colour, and has jaws like a Stag-beetle one inch long.

But the handsomest of all is the *Long-armed Capricorn* (*Lamia longimana*) of South America. It measures two and a half inches in length, and one inch in breadth. Its fore-legs are five inches long. Its head, thorax and wing-covers are dark olive-green, striped with red, yellow and white in a very singular manner, and resembling hieroglyphics.

The Snout-Beetles. (Curculiones.)

Occupy the lowest rank among Coleopterous Insects, partly on account of their head, which is prolonged into a bill-like pointed snout, with a very small mouth at the end and two triangular antennæ, and partly on account of their larvæ, which are maggots, like those of flies, having no legs. The female of these Insects bores holes, with her pointed mouth, in the vegetable body in which she deposits her eggs, and the maggots issuing from them enter the stems of annual and perennial plants, devouring all their internal substance, and destroying whole plantations and forests. The ravages occasioned by these maggots are seen on our fruit-trees, apples, pears, plums, chestnuts, hazelnuts, and in the rice, peas, wheat and other grains.

The Palm-Weevil. (Calandra Palmarum.)

Plate III. Fig. 15.

Is one of the largest Snout-beetles of North America, but it is found mostly in the tropics. I found it in St. Domingo, and have given an illustration, or rather representation, of it in the third Plate of this work, because it gives an excellent idea of the form and appearance of all the other genera and species of Curculiones.

This Beetle is about an inch long, and is black; it has large eyes, triangular antennæ terminating in a knob, and a long snout, upon which is a hairy crest like the mane of a horse; its wing-covers are striated.

Its larvæ are known in the tropics of America under the name of Palm-worms, and they live in large numbers in the trunks of several Palm-trees, but principally in the Cabbage-palm, (*Areca oleacea*,) which grows in abundance in the mountainous parts of St. Domingo. When fully grown, they are about three inches long, and one inch in circumference, of a dirty yellow colour, with a black head, looking like a piece of fat, enveloped in a transparent skin. These disgusting looking animals are roasted upon a wooden spit, or broiled, and eaten with dried and pulverized bread, seasoned with salt and pepper, and considered by many epicures as the *ne plus ultra* of delicacies.

It is a pity that the people of St. Domingo have not adopted the polite custom of the Austrians, who never sit down to a meal without bowing profoundly to each other and saying, "I wish you a good appetite!" This friendly and polite salutation would be peculiarly apropos before so delicate a dish.

The Cabbage Palm-tree has the same general appearance as the Cocoa-palm, but its fruits are not

larger than peas. The inhabitants frequently cut down these trees, for the purpose of getting from its top the unexpanded terminal leaf-bud, which weighs many pounds and is of a cylindrical form—this is called the Palm-cabbage, and is eaten in soups, or is boiled and prepared with vinegar and oil as a salad, and has really a delightful taste. Then they make incisions in the trunk, in order to entice the Snout-beetle there by the evaporation of the sap, and to have her deposit her eggs in it that they may afterwards obtain a large crop of maggots.

Another species of Snout-beetle is the

Wheat-weevil (*Calandra granaria*), which is not larger than a flea, oblong and chestnut-coloured. These Insects do immense injuries in granaries, by boring a hole with their snout into the grains of wheat, or barley, or rye, and depositing therein an egg, from which proceeds a white maggot, which devours all the farinaceous substance, so that nothing remains but the hull. These maggots live in this condition about thirty days, when they metamorphose into white cocoons, from which after about ten days the perfect Insects proceed, the females of which immediately deposit their eggs, each laying about one hundred and fifty.

This Wheat-weevil is originally a native of Europe,

and seems to have been accidentally imported here with grain.

The Rice-weevil (*Calandra Oryzæ*) belongs to the same genus, and is found, as its name indicates, in rice; where it may be seen every day. It is of about the same size as the preceding, but differs from it by having two spots on each wing-cover.

In almost all the different seeds we find very small maggots; which are afterwards metamorphosed into Coleopterous Insects, and are on that account called Seed-beetles. These animals, like the ones we have just described, have a prolonged snout, but comparatively much shorter, and a very short body.

The most destructive among them is the *Pea-weevil* (*Bruchus Pisi*), famous in Europe, but much more common in America, the larvæ of which live in peas. The Beetle itself is about the size of a bed-bug; round, flat on the upper surface, of a dark-brown colour, with white spots upon the thorax and wing-covers.

When the peas are in blossom and begin to have pods, the females deposit their eggs upon them, and we find therefore a very small maggot in almost every green pea, the existence of which can only be perceived by a small black dot upon it. In

almost every seed-pea also, we find a perfect Beetle, or at least an aperture from which it has already crawled out.

Now as this is a fact, of the truth of which every one can convince himself, it is safe to assert that in eating green peas we at the same time eat almost the same number of maggots. If therefore we are disposed to be disgusted with the Palm-worm eaters we would do well to remember that we practise the same thing in the case of the Pea-weevil.

In some parts of Europe they put their seed-peas into hot water, before planting, for the purpose of killing these Beetles, and several of our scientific American Horticulturists, according to Dr. Harris, advise to keep seed-peas in air-tight vessels over one year, before planting them, or at least not to plant them before the end of May.

The cultivation of peas is an extensive branch of agriculture in the Old Country, because dry peas, well prepared, are the usual favourite dish of the farming and operative classes throughout the year. Hence in France, Germany, Moravia, and Hungary, they sow peas in gardens, and cultivate them in extensive fields.

Leaf-eaters (Chrysomelinæ) are another species of noxious Beetles, who feed mostly on leaves or flowers. They are quite small, from three to five

lines long; their antennæ are filiform and granulated, and their legs generally short. Their mouth does not terminate in a snout, like those we have before described; but it succeeds in destroying leaves and flowers in great numbers. Their body is oval, and beautifully coloured, either crimson, or blue, golden-green, azure-blue, or variegated.

Their larvæ, or grubs, have six legs, and live mostly upon leaves, until they change into perfect Beetles.

This family contains a large number of genera, of which one of the handsomest is

The Gilded Dandy. (Eunolpus auratus.)

Plate III. Fig. 10.

Which is found throughout the United States upon the Dogsbane (*Apocynum androsæmifolium*), the leaves of which are covered with them in July and August.

This Beetle is so brilliant, that it is impossible to represent its splendid metallic colours in painting, changing as they do from green to a golden yellow, and from purple to crimson. Its wing-covers would form a beautiful ornament for those fancy-boxes I have before described, as its colours are pre-eminently brilliant and showy.

ORDER II.—BUGS (*Hemiptera*).

Cicadas, Bed-bugs, Squash-bugs, Tree-hoppers, Plant-lice, Shield-lice, Cochineal.

As no human eye can ever penetrate the spangled heavens that roll over us, covered with ruby and sapphire, and the thousand changing tints that dye the firmament,—as no created being can ever bring into his scope of vision that illimitable space, where the glittering stars unceasingly twinkle and glow, and where, o'erarching all, the Milky Way presents the blended light of billions of shining worlds,—so no human mind can ever attain perfection in the knowledge of those countless animated beings which surround man in the vast green temple of Nature. The utmost expansion of the human intellect can comprehend only a small part of the wondrous nature, life and character of the animated masses around him. The most gifted genius and the highest cultivation, combined with the longest experience, can only bring man to a knowledge of his ignorance and incompetence, and the burning thirst for more knowledge will only be satiated in adoring what it cannot comprehend. True, “immortal longings are within us,” but mortal limits surround us on every

side, and he who has approached even these the nearest, will be abashed at the immensity still before him, and can only bow in humility before the great Creating Soul of the Universe, the all-wise, all-mighty and all-loving Father—the same incomprehensible Being who has animated the mountainous bony frame of the Elephant, and built with wondrous skill and nicety, the delicate structures of those little living, moving atoms we call Bugs! And not only has breathed into them the breath of life, but, more wonderful still, has provided them with senses, with internal and external faculties; and constituted them equally essential parts in the vast economy of Nature.

Bugs are easily distinguished from other Insects, by having, instead of a mouth, a prolonged horny proboscis, or snout, in which are two pairs of bristles which they insert into the animal or vegetable body from which they derive their nourishment, by pumping out its juices. This proboscis is articulated to the head, and when in operation has a perpendicular, but when not in use, a horizontal position, being attached to the under part of the breast. Their head is usually small, and has two short feelers (antennæ); their breast larger than the head, and the hind-body is short and wide. All the Insects of this Order, the Bed-bugs and female Plant-lice

excepted, have four wings, which are erected, as in the Cicada, known under the name of Locust, or folded up, as in the *Squash-bug* (*Coreus tristis*).

Bugs do not metamorphose themselves into Caterpillars, like Butterflies; or into grubs, like the May-beetles; or into maggots, like Bees and Flies. They make no cocoons or chrysalis, but they burst from their eggs in an almost perfect condition, that is to say, with six legs and a proboscis, but without wings. The Cicadas form the only exception to this natural rule, and probably live in a larva state more than two years in the ground.

These Insects feed mostly on the juices of plants; but some of them pump out the circulating fluid of Insects, and even the blood of warm-blooded animals, on account of which they become very annoying and troublesome to man. Some of this order also give out a peculiarly unpleasant odour when mashed, an odour that is often perceived in the mouth when eating raspberries, blackberries, or any other berries, and which is occasioned by masticating with the fruit the eggs which these Insects have deposited upon it, and which are not easily detected by the sight. I once heard a country-woman consoling her little boy, who complained that the blackberries he was eating tasted so much like Bed-bugs, by telling him, "Never mind,

sonny, keep on eating them—our doctor, the blacksmith, says they are good for fever.”

Considered as a whole, the Insects of this order are not as injurious as are Caterpillars and many grubs, but some of them are quite destructive, as, for instance, the Plant-lice, which absorb so much of the juices of vegetables as to cause their decay. The Cochineal is the only Insect of this Order from which we derive great benefit, and that is of vast importance as a colouring substance. I say the only one—I ought, perhaps, to include the much-despised Bed-bug, for which I always had a great aversion until I accidentally learnt its utility. Some few years ago I fell in with an industrious mechanic, who had a wife and four half-grown children, living in Avenue B, New York,—all healthy, industrious, and in thriving circumstances. He told me that they all worked every day from three o'clock in the morning until eleven o'clock at night; and when I expressed my astonishment at their being able to work so hard with only four hours' sleep at night, he answered that they could not do otherwise, for they could not go to bed until from the want of sleep they were sufficiently benumbed to be insensible to the stings of the Bed-bugs, who after about four hours would overcome their insensibility and oblige them to leave their beds. Here behold the utility of Bed-bugs! they make industrious and wealthy.

Perhaps the consumption of the midnight oil and the early rising of college students may also, in some measure, be attributed to the friendly hints of these interesting Insects.

The Cicada, improperly called Locust, contains a number of species. *The Red-eyed Cicada* (*Cicada septendecim*), (Tab. IV. Fig. 17), which in all entomological works, particularly in the United States, is called the Seventeen-years Locust, makes its appearance every year according to my observations when abroad, and during my twenty-two years' residence in this country I have seen some of them every year, but myriads in 1829, 1834, 1843, and afterwards.

Linnaeus gave the specific name "Septendecim" to the Red-eyed American Cicada, because with the specimens of this insect sent him from America, he was told that it appeared only every seventeen years; an opinion that still now extensively prevails throughout our country. But reasoning from analogy alone controverts this opinion; for if we consider that all other species of Cicadas, either of the same size, or larger, or smaller, subject to the same metamorphosis and manner of living, spend only two years in attaining their perfect condition, why should the Red-eyed Cicada alone form an exception to this natural law of their species?

But facts speak in an unanswerable tone in this mat-

ter. According to Dr. Hildreth's account of the Cicada Septendecim, or Seventeen-years Locust, in Prof. Siliman's Journal, No. xviii., July, 1830, this Insect appeared in 1829 in immense numbers in the States of Mississippi, Missouri, Illinois, Indiana, Ohio, Pennsylvania, and New Jersey. But the same quantity were observed five years after, in 1834, in the States of New York, New Jersey, Pennsylvania, Maryland, Virginia, Ohio, Indiana, &c. This Insect also appeared again nine years after (1843), in innumerable swarms, in the Middle, Southern and Western States; and at every appearance the newspapers say, "This is the year of the resurrection of the Seventeen-years Locust, it being now seventeen years since it was last observed." The editors of the New York, Philadelphia, Baltimore, and Alexandria newspapers must therefore be very incorrect chronologists, or the years in those cities are much shorter than elsewhere.

Now it is a fact, that during my twenty-two years' residence in this country, not a single summer has passed without my seeing some of these Red-eyed Cicadas in one or other of the States, and hence I must maintain that the name Seventeen-years Locust is neither correct nor proper.

That there is a great difference in their numbers in different years is very true, and the same thing obtains with regard to other Insects; some years we are over-

loaded with them, and again in others there are scarcely any. This is particularly the case with the Rose-bug. The same thing also happens in the vegetable world—one year we are favored with an immense number of apples, peaches, grapes, &c., and the next year we see only a few of them. A superabundant number of other Insects which feed upon the Cicada, changes of temperature, and unfavourable weather, are probably the causes of increase and decrease in different years. And in spite of so many opponents, who believe that the Red-eyed Cicada appears only every seventeen years, I, according to my own experience, am obliged to say, "For all this, it appears every year," as Galileo, when he was compelled to undergo the sentence of public recantation for having taught the revolution of the earth, rose from his knees in saying "*E gira nemeno*:" Notwithstanding this, it revolves!

Another very general and very popular notion with regard to the Cicada is, that it is the same species, or at least the same genus, with that noxious Insect mentioned in the Scriptures as one of the plagues of Egypt. This also is entirely incorrect.

Eleven different names of injurious Insects occur in the Old Testament, called in the Hebrew, Arbe, Gob, Gobai, Gazam, Shagab, Chanamel, Chasil, Char-gol, Jelek, Solam, and Pselatsal.

Now in our English Bibles we find these words almost universally translated Locust, notwithstanding we have good reason to believe that almost all these insects mentioned, are according to their external and internal construction very far from being of the same nature with our Cicada, but rather belong to the Grasshoppers (*Sauterelle*, *Heupferd*). In the book of Deuteronomy, 28th chapter, 38th verse, we read, "Thou shalt carry much seed out into the fields, and shalt gather but little in, for the Locust shall consume it;" and in verse 42d, "All thy trees and the fruit of thy land shall the Locust consume." Now we cannot understand how it is possible that the Cicada, which with its proboscis sucks only the dew of leaves as its nourishment, and has no mouth with which it can masticate any thing, could occasion such immense ravages. But if we translate the Hebrew text, as Martin Luther did, with "*Heupferd*" or "*Heuschrecke*" in German, and with "*Sauterelle*" in French, which is "*Grasshopper*" in English, designating a very voracious insect, provided with two powerful jaws, and an animal very common in Africa, Asia, and the East of Europe, we readily perceive how it is possible for such a creature to occasion famine and pestilence.

It is time that such unpardonable mistakes were corrected in our English version of the Sacred Scriptures! It is time that the word of Truth should not

be made a lie through the ignorance of man! high time that correct notions of the beings that live and move about us were more universally disseminated! This very error in the translation, originating from ignorance of entomology, has often caused intense anxiety and alarm among the people of different parts of this country, at the appearance of an innumerable swarm of Cicadas. They have actually imagined themselves afflicted with the Plague of Egypt, and apprehended famine and pestilence. To avoid this mistake, let us change the word "Locust," wherever it occurs in the Bible, into the word "Grasshopper"—an Insect of which we shall presently speak at length, and in whose natural history will be found many additional reasons why it must be the Insect designated in Scripture, and no other.

Our Cicada, commonly called Locust, is a harmless, lovely creature, and has been celebrated for its song from the most ancient times. "To the ancient Greeks no sound was more agreeable than the chirping of Cicadas, not only because it seemed to give life to the solitude of the shady grove and academic walks, but because it always conveyed to their minds the idea of a perfectly happy being." So delighted were they with its song, that they kept it in cages, and called it "the Nightingale of the Nymphs"—"the Sweet Prophet of the Summer"—"the Love of the Muses,"

&c. Indeed it was regarded by all as the happiest, as well as the most innocent of animals.

By both Greeks and Romans, it was also considered as an excellent article of food, particularly the female before she had deposited her eggs, and Aristotle says of it, "Quo tempore gustu suavissimæ sunt"—At which time they taste very sweet.

The genus Cicada is found in all the temperate climates and warm countries of the globe. In the south and east of Europe they are continually singing, and continually an object of admiration. They dwell upon the olive and other trees, but principally upon the ash, from the bark of which, when pierced by their stings, there exudes a liquid substance, which becoming dry, is known under the name of "manna," and which some have supposed to be identical with that manna of which the Israelites did eat in the wilderness. This supposition, however, is probably incorrect, because the substance of which we speak is very cathartic, and is used as such even at the present day. But Ehrenberg discovered another species on Mount Sinai; produced upon the Tamarisk tree by the stings of a Plant-louse (*Coccus Manniparus*), which tastes like honey, and which may possibly be identical with that mentioned in the Bible.

The *Red-eyed Cicada* (*Cicada Septemdecim*, Tab. IV. Fig. 17), with red-bordered wings, and the *Iyer-*

man, with green-bordered wings, (*Cicada Tibicen*, Tab. IV. Fig. 18), are the most conspicuous species of North America. But the natural history of all the different species is the same. All have an inflected snout, very short setaceous antennæ, four membranaceous wings, and six feet. The females have a long, horny ovipositor, and only the males possess the singing organ, which is an extended, moveable membrane on the under side of the abdomen, by the rapid vibration of which they produce their peculiarly loud and shrill sound. The females are all dumb. Virgil says—

“—————raucis
Sole sub ardenti resonant arbusta Cicadis.”

Or, in English rhyme—

“While the scorching sun beats down upon the plain,
The bushes echo with the hoarse Cicada’s strain.”

But Anacreon praises them, and in one of his odes compares them with the gods. William Spence, in his “Introduction to Entomology,” thus translates the satirical words of the ancient Greek philosopher, Anaxagoras—

“Happy the Cicadas’ lives,
Since they all have voiceless wives.”

But a German writer, who was probably an old bachelor, in order to show that females of the human

species are perhaps too much favoured with regard to the organ of speech, says, in a very sarcastic manner—

“Quando conveniunt Mariella, Sybilla, Camilla,
Sermonem faciunt et ab hoc, et ab hac, et ab illa.”

According to the observations of several species of Cicadas made by Pontedera, Aldrovand, Reaumur, and many others, the females deposit many hundred eggs in the tender branches of trees, by slitting the bark with their horny, sharp-pointed ovipositor. Their eggs are white, flat, oval, and about the sixteenth of an inch in length. If the weather is favourable to them, the eggs are hatched in about six weeks, when the young ones leave the tree in the condition of larvæ, each one being provided with a mouth and six strong feet, resembling the flea. They then retreat into the ground, where they feed on roots, according to the observations of Pontedera, for two years, after which time they come out of the ground, climb upon a fence or the trunk of a tree, burst their transparent shell (Plate IV. Fig. 19), and assume their perfect form as four-winged insects. They now mount in the air, and enjoy their short life, flying from branch to branch and from tree to tree, making music as they go, and in the brief term of four or five weeks fulfil their last destiny, viz., to propagate their species.

“———once a worm, a thing that crept
On the bare earth, then wrought a tomb and slept.
And such is man—soon from his cell of clay
To burst a seraph in the blaze of day.”

These two Cicadas cannot be classed among the injurious insects, for they cannot devour our vegetables and fruits like other Insects, because they have no mouth—and as has been said before, they suck with their snouts only the dew of leaves for their nourishment, during the two short months of their existence in their perfect form. Even in their subterranean abode, during the condition of larvæ, although feeding upon the roots of several plants, their injury to vegetation is very trifling, and scarcely enough to indicate that the little creature dwells in the ground.

On the other hand its utility is unquestioned—thousands of the feathered tribe find in them a delicious food, and Dr. Hildreth, of Marietta, Ohio, says in his work already mentioned, that when the Cicadas first leave the earth, they are plump and full of oily juices, so much so that they have been used in the manufacture of soap! It has also been reported that the Indians boil them and consider them a very palatable dish. *De gustibus non est disputandum.* (Every one to his own taste.)

The Cicada is the largest Insect in this order, some of the exotic species measuring between six and

seven inches in the expanse of their wings. Their legs, as has been seen, are most adapted for leaping, and their principal characteristic consists in the structure of that peculiar double apparatus, by which the males are enabled to execute their music. The peculiar construction of this apparatus has been carefully investigated by Reaumur, and made known in his "Memoirs."

Mr. Westwood, in his "Introduction to the Modern Classification of Insects," says, that of one hundred and fifty species of Cicada contained in the Royal Museum at Berlin, seventy are from America, fifty from Africa, twenty-five from Asia, including Java, ten from the south of Europe, and six or eight from New Holland; showing that it is chiefly in the tropical parts of the world that the largest and greatest number of species are found.

The Indians of South America say and believe, that the Lyerman (Cicada Tibicen) is changed into the *Lantern-fly* (Fulgora Laternaria), whose cap, in the night, emits a light similar to that of a lantern.

I have several times spoken of the impostures to which those are subjected who are ignorant of Natural History. There have been people who considered themselves well-educated, that have actually believed and circulated such absurd fables as e. g. that there are whole races of men with tails like those of the

monkey tribe, of Hottentot women with natural aprons, of American Indians without a beard, and of Sirens, Mermaids, and the like. In the Natural History of Insects, too, marvellous stories are introduced by travellers in foreign countries, who have implicitly relied upon the reports of the ignorant natives, and whose stories, however absurd, have gained credence. This is the case with regard to the Lantern-fly, which is a native of South America, but which from its bodily construction belongs to the order we are now describing. This Insect is provided with a comparatively large bladder, which is placed before its head, and from which, it is said, comes a strong light, as bright as that of a candle. This lightning story originated more than a century and a half ago, from the work of the celebrated Madame Merian, who lived several years in Surinam, and who says that one day the Indians brought her a large number of living Lantern-flies, which she put into a box, but they made so much noise during the night, that she rose from her bed and opened the box, which however she immediately dropped on the ground, so frightened was she at the multitude of fiery flames issuing from it.

Now modern naturalists, such as Prince Max of Neuwied, Prince Paul of Wurtemberg, Count Hoffmansegg, Mr. Lacordaire, and several others who have

travelled in those countries, and have collected a number of them alive, state that none of the specimens they have ever seen alive, exhibited the least appearance or trace of luminosity. And indeed of what use could such a lantern be, placed directly before the eyes of the Insect? If we were obliged to carry a torch-light upon our foreheads directly in front of our eyes, we should be so dazzled that we could see nothing. This Insect is three inches long, its head being of itself only a few lines in length, but, with the lantern, as long as its abdomen. It still retains its name of Lantern-fly, but its supposed light has long since been considered by naturalists as an ignorant superstition, or, at best, as a fact unsubstantiated by any of the species existing at the present day.

With regard to the marvellous interpolations in Natural Science, I cannot forbear quoting from the work of the late Thomas Say, the following examples: "We are told, that there was a time, when a piece of wood was transformed into a serpent, and even in the present age of knowledge, a hair fallen from the mane or tail of a horse, into a stream of water, is believed by many to become animated into a distinct being; dead leaves shed by the parent tree, are said to change gradually into animals of singular shape, and to have changed their place of abode under the eye of the historian who related the wonderful tale; dead sticks

were also said to sprout legs, to move from place to place, and perform all the functions of a living body. These, and a thousand other equally ridiculous stories, were, at one period or another, more or less generally admitted as indisputable truths, and to contradict them would only be to expose one's self to the imputation of ignorance, or criminal faithlessness. And although at present the possibility of making a living serpent out of wood, and the story of animated leaves and sticks, would be despised as absurd, yet many are to be found, both in Europe and America, who firmly believe in the animation of a horse-hair. But the most obvious errors have often a shadow of truth whereon to rest, or palliate, if not excuse them by the plea of ignorance or mistake. The historian of the walking-leaf may have been deceived by the *Mantis Siccifolium* of Linnæus (the Soothsayer), the wings of which bear some resemblance to a leaf. The *Gordius* (a worm) resembles a horse-hair, and no doubt gave rise to the story of the metamorphosis above mentioned, and the account of the walking-sticks may have very honestly originated from the singular appearance and form of the Insect which bears this name."

I have above mentioned the name of Madame Merian as originally circulating the story of the Lantern-fly, and as her name is somewhat celebrated in the

annals of Natural History, a more extended mention may not be unacceptable to my readers.

Madame Maria Sibilla Merian was the daughter of Mathew Merian, a distinguished French artist. She was born in 1647, at Frankfort-on-the-Main, and early in life devoted herself to drawing and painting, particularly plants and insects. At the age of eighteen she was married to a painter of Nuremberg, named John Andrew Graf. This marriage did not prove a fortunate one, and a few years after it took place, Graf's affairs became so much involved, and his conduct in other respects so censurable, that he was obliged for a time to leave the country. In consequence of this separation, Madame Merian never assumed her husband's name in any of her publications, but became known to the public by her maiden appellation.

After her separation from her husband, she for a long time abandoned all kinds of company, and devoted herself exclusively to the painting of insects, in order to be able to represent them with sufficient accuracy for the purposes of Natural History. The result of her labours in this department, appeared in 1679, in three volumes, published at Nuremberg, the plates being engraved by herself.

The difficulty of preserving Caterpillars and other larvæ, is sufficient to account for the small number

to be found in cabinets, even at the present day, and the most obvious and satisfactory method of making up this deficiency, is by coloured drawings taken from living specimens. The desire of supplying this important desideratum, in regard to some of the more remarkable insects of America, as well as of determining the nature of their metamorphosis and kind of food, had more influence in leading Madame Merian to visit this country, than her wish to delineate the perfect insects, many of which were already well known in Europe from the preserved specimens.

She accordingly set sail for America in the year 1699, accompanied by one of her daughters. The place of her destination was Dutch Guiana, often called Surinam, from a river of that name, on which the capital, Paramaribo, is situated, and lying between the fourth and sixth degrees of north latitude. In this fruitful region, her ardent curiosity found ample means of gratification, and she remained nearly two years, diligently employed in collecting and painting insects. She returned to Europe, and gave those splendid paintings to the public in 1705, in a work entitled "*Metamorphosis Insectorum Surinamenisum*, etc., the text drawn up by Gaspar Commelin, from the manuscripts of the author."

This heroic and industrious female naturalist, who has contributed so much to the improvement and

embellishment of the Natural History of Insects, died in the year 1717, at the advanced age of seventy years.

The Louse. (Pediculus.)

Among the Hemipterous Insects, which are distinguished from the other orders by their suctorial organs, as well as by the fact that they do not undergo a perfect metamorphosis, the Bugs, properly so called, form a very considerable number of different species, some of which, particularly those of the tropics, are ornamented with the most beautiful colours. They live upon animated beings, both on land and in the water, also in forests, gardens and meadows, and are, according to their food, either carnivorous or herbivorous.

I trust I shall be pardoned for introducing to the notice of my readers, a very disgusting Insect, which seems to have been created for the purpose of punishing inattention to personal cleanliness.

Certain parasites, whose destiny it is to dwell upon the human body, and which we call lice, have been placed by Linnaeus and his followers among the wingless (apterous) insects, but if we consider that they, like the Hemipterous Insects, are provided with a suctorial organ, also with air-holes for breathing, and do not undergo a perfect metamorphosis, we are forced to place them, like the wingless bed-bugs, in this

order. The other parasites, which live upon beasts, birds, fishes and insects, and which are also called by the people, lice, belong to different other orders, of which I shall speak in some of the following numbers.

Many years ago, when people paid very little attention to personal cleanliness, it was generally believed to be a sign of good health to be infected with lice, by whom it was thought the impure juices of the body were extracted. Parents were, on that account, glad to see the heads of their children covered with sores, which were thickly populated with this vermin. But when they became better instructed, and began to keep their children clean, these insects ceased to be fashionable. For this purpose it is probable that hair-powder, pomatum, and hair-oil were chiefly invented, and generally used, because every kind of grease destroys these insects, by stopping up their air-holes or breathing organs, and they immediately fall into convulsions and die. An experiment that may be repeated at pleasure on caterpillars.

These disgusting creatures make their abode principally upon the heads of human beings, as may be seen, for instance, in the haunts of the filthy poor everywhere, or the poor oppressed Jews and peasants of Poland, or the down-trodden and degraded countrymen of Italy, and the innumerable host of beggars with which all her churches swarm.

According to the observations made in the year 1687, by the celebrated Dutch philosopher, Leuwenhoeck, the female Louse, in the course of six days, lays fifty white eggs, which are called Nits, and from which, after six days more, proceed the young ones, which are perfected in eighteen days. In this manner, such a female may have the satisfaction of being grandmother to a progeny of five thousand individuals around her, in the short space of eight weeks. This species is called the *Head-louse* (*Pediculus Capitis*).

Another species, also a nuisance to the human family, is the *Body-louse* (*Pediculus Vestimentorum*), whose favourite dwelling is in the folds of the shirt-collar, and which very often produces that generally incurable disease called phthiriasis. It is humbling to human pride, and the high conceit of mortal man, to think that the poor and the rich, the ignorant and the wise, princes, kings, and emperors, have been and are alike subject to this misfortune. Examples are not wanting: the Dictator Sylla, the two Herods of Judea, the Roman emperor Maximian, and the mighty Philip II., king of Spain, and many others, have been carried off by this disgusting, incurable malady, in which the whole human body becomes covered with sores, and is literally eaten up alive by these insects. See "Maladies de la peau par Alibert, 1806."

The Bed-bug. (Cimex Lectularius.)

Bed-bugs are unfortunately everywhere well known. They are found throughout the world, from the seventieth degree north latitude, to the seventieth degree of south latitude, in both hemispheres, and inhabit principally the houses of populous cities. The walls of hen-houses are also sometimes entirely covered by them, and what is very singular, the fowls themselves are never attacked by them, but as they people rapidly in warm fowl-manure, it is conjectured that they feed on them. Hen-houses near a dwelling-house, are on this account dangerous.

That Bed-bugs suck the blood of man, is very well known, but it is not so certain that blood is their only nourishment. I found them in abundance in the pine woods of Finland, near Wiborg, in Europe, as well as in the pine woods of North America, and in newly-constructed frame houses. It is probable, therefore, that they feed on the sap of pine wood.

In England, it is believed that this vermin is a native of North America, and was accidentally brought over to Europe in the pine timber. But this can hardly be the case, as Aristotle, who lived three hundred years before Christ, mentions this insect in his "Historia Animalium," and so does Pliny, some centuries later, in his Natural History. They are

Plate IV.

Fig 17.



Fig 19



Fig 18



Fig. 20



Fig. 21



undoubtedly natives of a warm country, for they like a high temperature, and are benumbed in winter, although experiments have been made in which an exposure to a temperature of five degrees below 0 of Fahrenheit did them no harm. Like reptiles, they can also live many years without food, as the German naturalist Goeze has proved, who kept them alive six years without any nourishment.

Kotzebue, then colonel in the general staff of the Russo-Caucasian Army in Yiflis, assured me, when I was there (1825), that he has seen several persons, when travelling in Persia, victims of the venomous bite of the Persian Bug.

This Insect, though it is neither a native of North America, nor does it belong to the Hemipterous Order, is too notorious to pass over in silence.

The *Persian Bug* (*Agras Persicus*) is similar to a Bed-bug in colour and form, but a little larger, and provided with jaws. It has long been known as the venomous bug of Miana in Persia, which city lays south from Tauris. That same Mr. Kotzebue, the son of the celebrated unfortunate German poet, August Kotzebue, Russian Councillor of State, who was assassinated 1818, in Manheim, by the student Sand, went as attaché to the Russian Embassy of General Yermoloff to Teheran, and published afterwards in Germany, his "Travels through Persia," in which he,

says: "The city of Miana, with the surrounding country, is renowned on account of its venomous bugs. They live in the walls of old buildings, and the older the masonry, the more abundant and venomous they are. Several villages are entirely deserted, because their inhabitants have been driven out by those venomous bugs."

Those bitten by them, become crazy, mad, and die with terrible convulsions.

With regard to the general protection of animals in some parts of Indostan, we find a very curious article in "Forbe's Oriental Memoirs," who says: "The Banian hospital at Surat is a most remarkable institution. At my visit, the hospital contained horses, mules, oxen, sheep, goats, monkeys, poultry, pigeons, and a variety of birds. The most extraordinary ward was that appropriated to rats and mice, *bugs*, and other noxious vermin. The overseers of the hospital frequently hire beggars from the streets, for a stipulated sum, to pass a night amongst the *fleas*, *lice* and *bugs*, on the express condition of suffering them to enjoy their feast without molestation.

O stulta sanctitas, O sancta stultitia !

The Squash-Bug. (Coreus tristis.)

Tab. IV. Fig. 20.

This Insect, which conceals itself during the winter, in the crevices of houses, walls, and the bark of trees, makes its appearance in the open air as soon as warm weather commences, and takes up its abode, for the most part, upon or under the leaves of squashes, pumpkins, and other plants of the Gourd tribe. It is also often seen upon the potatoe vine, and other herbaceous plants, and toward the middle of summer it fastens its eggs, with a gummy substance, upon the under sides of the leaves of these plants. These eggs are soon hatched, and the young, in company with the old ones, proceed to suck with their reflected snout the sap of those leaves and stems, often causing the whole vine to wither and perish.

The young ones, which are quite as voracious as their parents, are furnished with wings in the autumn, and as soon as the inclemency of the weather and the want of food obliges them to do so, they fly away to take possession of their winter-quarters, in the holes of walls, or the crevices of houses and the bark of trees.

These Insects emit an odor, when touched or mashed, very similar to that of the Bed-bug, and the

wound they inflict with their horny snout, is fully as inflamed and painful.

There is no better remedy to prevent the injuries done by these Insects, than to examine the squash and pumpkin vines every day, and destroy them; for, to use the argument adduced in favour of capital punishment, if they are killed, they are forever out of the way. I would suggest, that for boys in the country this would afford a fit and amusing occupation, when out of school; thereby keeping themselves and the bugs from doing mischief.

This species of Bugs, as well as all kindred ones, inflict often painful wounds, which are sometimes more venomous than the sting of a scorpion, which is often experienced in tropical countries, and produce tumors as big as the egg of a pigeon, for several days. But it is much more singular, that there is found in the West Indies, a bug known by the name of the Wheel-Bug (*Reduvius serratus*), which, like the Electric Eel and the Torpedo, communicates to the person whose flesh it touches, an electric shock, which comes out from its legs.

Tree-hoppers. (Membracis.)

Tab. IV. Fig. 21.

The *Tree-hoppers* are mostly of a green colour, and small size; they have four wings, and a very large

thorax or chest; they possess the power of leaping a distance of five or six feet, which is about two hundred and fifty times their length. They generally remain motionless for hours upon the leaf of a bush or tree, imbibing the sap of the plant, but at the approach of any one they suddenly leap with great ease into the air, at the same time spreading out their wings, and fly to some other abode.

They feed mostly on the leaves of the oak, the locust, and several other trees. But their injury is of no great importance. The principal species of Tree-hoppers, are the

Membracis	Ampelopsidis,	on the	Ampelopsis	vine ;
“	bimaculata,	“	locust-tree,	
“	univittata,	“	oak-tree, &c.	

Plant-Lice. (Aphis.)

Like the preceding Insects, the Plant-lice belong to the order of Bugs which constitute the Hemipterous Insects. They have small round bodies, of a brown, black, yellow, or blue colour. Some species are provided with wings, some others have none, but on the back of all of them may be seen two honey-tubes, or honey-warts, from which issues a sweet substance very much liked by the Ants. For this reason we find even such carnivorous Insects as the Ants, on friendly and intimate terms with the Plant-lice. In

fact, they are called the milk-cows of the Ants, because the latter suck from them the sweet juice of their honey-tubes. They are as careful of them as we of our cows, protect them from their enemies, and in case of danger, even carry them away in their mouth very carefully to a safe place. This sweet fluid of the Plant-lice is also often seen upon the branches of trees or shrubs, a glutinous substance known by the name of honey-dew, and eagerly sought by Ants. If, therefore, we see Ants running up and down the branches of trees and shrubs, we may consider it a certain indication of the presence of Plant-lice.

There is scarcely a tree, or bush, or herb, that grows in our gardens or fields, that is not infested with some species of Plant-lice. And in spite of their diminutive size, and the disgust we naturally have for them, a host of interesting associations are connected with them. Their manner of living, and of reproduction also, have attracted much interest. They both deposit their eggs and bring forth their young alive, a phenomenon which does not take place in any of the winged Insects. Their multiplication is immense, and considering the size of the animal, really astonishing, for it is a well known fact that one single Plant-louse is capable of producing ninety young ones, from which spring myriads more. From the month of April to November nearly twenty generations are born, and

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if their number were not checked by their numerous enemies, as well as by wet, damp weather, and cold winters, all of our vegetable productions would not suffice to nourish them.

The principal species of this country, which may be seen and examined everywhere, are:

The Rose-louse : (Aphis Rosæ) which is green.

The Pig-nut " (A. Caryæ) which is the largest, viz., one quarter of an inch long, and covered with a bluish woolly substance.

The Cabbage " (A. Brassicæ) covered with a white mealy substance.

The Willow " (A. Salicis) which is black.

Shield-Lice. (Coccus.)

The *Shield-louse*, also called Bark-louse or Scale Insect, is found upon the branches and leaves of trees and bushes, upon which it sits motionless, as if it were glued on, looking more like a wart than a living creature. This, however, is the case only with the female, who inserts her snout into the branch upon which she sits, and remains there imbibing the sap of the plant. In this condition also she deposits her eggs, and after having done so she dies upon the same spot, leaving her dead and dried body a cover and shelter to her young ones. The males have no snout, and walk about the branches at their pleasure.

The body of the Shield-louse is oval, and the head, thorax, and abdomen run into one another so imperceptibly, that the whole appearance of the animal is like that of a shield, or buckler. Hence its name.

I have before remarked, and I may often have occasion to repeat the remark, that to the lover of Nature, nothing, even the most vile and insignificant object that lives, is without some points of interest—each has something curious in its construction or mode of life, or manner of reproduction, or in its uses—aye, and more so in the injuries it is capable of doing! It sometimes seems as if the meanest and most trivial of earth's creatures were created for the express purpose of working out the vastest amount of evil! As if there was nothing else to distinguish them, or make them deserving of notice! And when God-like Man, the highest link in the animal creation, the last step between the creature and the Creator, when such as he attempts to procure renown by the vast amount of injury he can inflict; when, undistinguished from his fellows, save by the halo of destruction that surrounds him, he mounts the throne of human glory by “making countless millions mourn”—(and not a few have clothed themselves with such unenviable immortality!)—why should it not be so with the meanest Insects? Independent of its curious construction, why

should not the subtle manner in which it works a vast amount of injury, prevent even the vile Shield-louse from being passed by unnoticed among those of its order? Let the vain man who would imitate it, think of the base level to which he must stoop, and from this insignificant animal learn one of the lessons Nature is everywhere teaching!

Probably hundreds have passed through their orchards, day after day, without noticing this Insect, although myriads have been in sight. Many well-educated farmers have seen their peach-trees covered with brownish warts, and have suffered them to wither and die, without dreaming that these warts were live animals, sucking the sap, the life-blood of the tree; and yet these motionless excrescences have laid waste whole orchards, have devastated the fairest of bushes and the most fruitful of trees, and in place of fragrance and verdure, have left naught but desolation and decay. They are essentially noxious Insects, which, if unmolested, multiply immensely, and hence should be carefully sought upon the branches of our trees, and as often as they make their appearance destroyed at the point of the knife. Their colour very nearly resembles that of the branches upon which they alight, usually a brown or black, but sometimes a reddish or violet, and hence they scarcely ever attract attention unless looked for. The branches of peach-

trees are their particular resort, and may often be seen covered with them, making the branches look rough and knotty, and the leaves and fruit dirty and black from the rain washing upon them from the bodies of these filthy Shield-lice.

The Cochineal. (Coccus Cacti.)

My readers, I presume, will find it an agreeable transition to pass from an Insect whose only distinguishing quality seems to be its noxiousness, to one justly celebrated for its utility—to one abounding in interest and curiosity—to one to which they are indebted for the most beautiful of the colours which adorn their persons and “beautify the human form divine.”

It is a wonderful thing to look abroad over the face of Nature, and see how every mineral, vegetable, and animal production is constituted so as to minister, in some way, to the wants of man—to see the vegetable world silently engaged in extracting mineral matters from the soil, and storing them up for man—and man, impelled by instinct, selecting these as his own proper food—to behold not only his food and drink flowing constantly to him through the ever-revolving cycle of three kingdoms, but even his most valued ornaments presented through the same

natural channel! It is more than wonderful, it is sublime, to view atom after atom of the whole creation unceasingly changing place, that man, the lord of creation, may be abundantly supplied with all his comforts and his luxuries; to see the lilies of the field, and the insects of the earth and air, living and dying for, man yielding up their lives for man's sustenance and adornment. True, "the lilies of the field take no thought for the morrow," but the unseen finger, that opens their petals to the day, points them out as the appropriate food to some of those animals whose life or death ministers to man! The blooming Cactus not only charms the eye of man, and makes the arid desert blossom as the rose, but it furnishes food for an Insect that lives upon it, and grows and dies to clothe man with the same resplendent dye.

This Insect is the Cochineal, a species of Shield-louse, also called Scale Insect, of the genus *Coccus*, and of the order Hemiptera.

This little Insect has a curious history. It was used for dyeing the most brilliant and beautiful red and purple colours, and was considered a valuable article of commerce, from which much money was made, long before it was known what the substance was composed of.

The French Naturalist, Plumier, in 1692 excited the ridicule of his nation, and was considered a fool,

because he pronounced the Cochineal to be an Insect. But in 1714, the French Philosopher, Geoffroy, proved the opinion of Plumier to be correct. By moistening these supposed seeds in vinegar, Geoffroy was able to detect the ringlets of its body, as well as its feet, and accordingly pronounced, unhesitatingly, the Cochineal to be an Insect. Ruusscher, in Holland, held the same opinion, and was publicly assailed for it, on account of which he caused the Cochineal cultivators to be summoned before the court of Antiguera, in the valley of Oaxaca in Mexico, there to be examined with regard to the origin and nature of these creatures. The examination proved Ruusscher's opinion correct, and the Cochineal henceforth was considered an Insect. This was probably the first instance in which an animal was restored to its natural rights by the decision of a Judicial Court.* And notwithstanding it may be deemed out of place, I cannot forbear the remark, that this decision of a court should put to blush those who prevent the "fair sex" from finding the same favour at the Court of Human Rights. Truth and justice must eventually prevail, and we trust the distinguished Mrs. Paulina W. Davis, the amiable and persuasive philanthropist of Woman's Rights, will yet see some of the results

* See *Naturlyke Historie von de Cochenille*. Amsterdam, 1729.

of her benevolent and disinterested literary labours in the amelioration of that class of oppressed females whose welfare she so ably advocates. We believe the day will come when stout young men, to whom Nature has given a constitution for hard physical labour, will yield the sale of lace, needles and thread, ribbons and shoestrings, and all such light work, to the tender sex, so many of whom are now ruined for the want of a proper compensating employment.

The Cochineal is a natural production of North America, and is found principally in Texas, Mexico, and the Lower California. It looks like irregular grains, scarcely as large as a pea, which are convex on one side and concave on the other, and of a reddish, slateish-white colour. As has been mentioned, it is a species of Shield-louse, but was always supposed to be a grain growing upon the plants upon which it is found. It is principally found upon the Prickly-pear (*Cactus Cochenilifer*) and other species of *Cactus*.

There are two sorts of Cochineal which are used in commerce; viz., the domestic, which is cultivated upon the Prickly-pear, planted in large quantities expressly as food for this Insect, and the wild, which is obtained from the spontaneously-growing *Cactus*.

Mexico is the only country in which the Cochineal are raised expressly for commerce, and this principally in the provinces of Tlascala, Oaxaca, Guatemala and Honduras, from which places alone, according to the account of Humboldt, there are every year exports of this article amounting to two and a half millions of dollars. An enormous sum indeed to be annually expended for Insect cadavers

There are, for this branch of industry alone, plantations containing more than fifty thousand Cactus plants, cultivated for no other purpose than to serve as food for these valuable little Insects. The collection and preparation of this article of commerce most generally falls to the lot of the Indian woman.

It is a remarkable circumstance, that the dried Cochineal never perishes, and may be kept in store-houses perfectly preserved for hundreds of years. A fact which clearly indicates the use which Nature intended should be made of it.

The best treatise on the Cochineal, and one which contains every thing that is known or can be said of it, is that written by Thiery de Menonville: "*Traité de la culture du Nopal, et de l'éducation de la Cochenille*. Paris, 1787:" to which I refer the reader.

The Cochineal Insect is often found in our hot-

houses on the Prickly-pear and other species of Cactus, and it might easily be raised in many parts of our country for amusement or experiment, but owing to the high price of manual labour we could not at present, and probably never, compete with Mexico in cultivating it as an article of commerce.

The Spaniards have imported this Insect into Spain, and the French into Algiers, but with what success they will cultivate it, is as yet problematical, as the former are not sufficiently encouraged by their rulers, and the latter prefer the sight and sound of swords, guns, and bayonets, to the more pleasant and profitable pursuits of Agriculture.

Another species of Shield-louse, although not a native of North America, deserves a passing notice on account of its great utility in the production of a most important material for manufacture and commerce: this is

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The "Coccus Lacca," a native of Indostan. This Scale Insect is found upon the branches of Banian trees (*Ficus religiosa*), and several other trees and shrubs, where it secretes from its body a hard, gummy substance, adhering to the branches like a crust, and well known in commerce by the name of shell-lac. This substance is a most invaluable material in the manufacture of varnishes, sealing-wax, beads, arm-bracelets, necklaces, water-proof hats, &c., and

is extensively used in dyeing. Mixed with very fine sand, it forms grindstones, and added to lamp or ivory black, being first dissolved in water and a little borax, it composes an ink of a very good quality, and when dried not easily acted upon by dampness or moisture. Notwithstanding the vast amount of this substance that is constantly consumed in manufactures of various kinds throughout the world, still this little Insect produces it so fast and so abundantly, that were the consumption of shell-lac ten times greater than it is, it could readily be supplied.

There are many other species of Shield-lice found in the old countries, which have from time immemorial furnished a substance used for dyeing red, and which are still used for that purpose. Hence their name among the Greeks and Romans was "Coccus," by the Arabs called "Kermes," and by the Persians "Alkermes."

Professor Ehrenberg, of Berlin, to whom the science is so much indebted for his laborious microscopic investigations of the Animalcules, found large Tamarix-trees (*Tamarix mannifera*, Ehrenb.) upon Mount Sinai, the young shoots of which were covered with a species of Shield-louse, which he called *Coccus Manniferus*.

These insects, by puncturing the branches with their proboscis, cause them to discharge a large quantity of gummy secretion, which very soon hardens and drops from the tree, when it is easily collected by the natives, who believe it to be the real manna of the Israelites.

Our currant bushes, young apple, and peach trees, often suffer from the ravages of different species of bark-lice, and not unfrequently are destroyed by them. Many small birds feed principally on these species of Lice, but in spite of this, their multiplication is often so great, that we must rely upon other and artificial means to destroy them.

Dr. Harris, of Cambridge, mentioning them in his "Report on the Insects of Massachusetts, injurious to vegetation," says, "the best application for the destruction of the Lice, is a wash made of two parts of soft soap, and eight of water, with which is to be mixed lime enough to bring it to the consistence of thick white-wash. This is to be put upon the trunks and limbs of the trees with a brush, and as high as practicable, so as to cover the whole surface, and fill all the cracks in the bark. The proper time for washing over the trees, is in the early part of June, when the insects are young and tender."

This may appear to my enthusiastic young friends, like advocating wholesale murder, and they may deem

me to have lost that universal benevolence and love, which the study of Natural History usually inspires, when I recommend the massacre of many millions of little insects, whose only crime is, that they eat the food that Nature has instinctively prescribed for them. It is true, all that is positively injurious, ought not necessarily to be destroyed, still it is right that of two evils we should choose the least. A distinguished modern reformer, of Germany, has recently published a pamphlet, entitled "Murder and Liberty," in which he maintains the legality and moral right of assassinating all sovereigns and despots wherever they are to be found in the world. He premises his argument upon the fact, that it has been, and is considered legal and right for all crowned heads to arraign and execute every patriot and political reformer, whenever and wherever he may be found : ergo, he argues, the same legality and right belongs to the patriot and political reformer, to kill all crowned and uncrowned despots, whenever and wherever they may be caught.

Now, if such a doctrine finds adherents, I am sure I need not fear to recommend the massacre of all injurious insects, and upon the same principles of logic ; they kill trees and shrubs, ergo, we should kill them.

The few Insects here mentioned, constitute but a small part of the numerous order Hemiptera, which together with the preceding, are generally known under

the common name of Bug, and like those, are usually treated as objects of disgust, or of fear. They are real natural bug-bears to those unacquainted with their character or history.

The general deficiency in the knowledge of Natural History, is however, the greatest bug-bear to me, and I cannot but lament, seeing it in so many otherwise well educated men and women, in the editors of some of our distinguished journals, and in most of the travellers who are constantly publishing accounts of their journeys in foreign lands. How much more rich, amusing, interesting, and instructive, would these reports be, if their writers could adorn their topographical descriptions and special histories of foreign lands with information concerning some curious beasts, birds, reptiles, fish, insects, or plants, which they have accidentally met in their journeys. That lovely writer, Bayard Taylor, in his beautiful letters published in the New York Tribune, is perhaps, the only traveller who occasionally enters the dominion of Zoology and Botany, and thereby adorns his masterly compositions, written with all the fiery imagination of an accomplished poet. He has set an example to all travellers, by contributing in this manner, useful and important ornaments to one of the most distinguished journals of America, the New York Tribune ; distinguished for the instructive matter it contains for all classes of men, for the litera-

ry and scientific, the artist, the agriculturist and manufacturer, the statesman and politician, as well as for the independent and disinterested boldness with which it seeks to protect the wronged and oppressed, the poor and the friendless; distinguished in fact, as being a real Encyclopedia of the present history of the world of Art, Industry, Science, and Politics.

Now, the deplorable ignorance that so universally prevails with regard to Natural History, arises not from any deficiency of genius in the American people, but it arises from the fact, that our Schools, Colleges, and so called Universities, which are the leaders and guides of general education, almost entirely neglect this department of Science. Hardly any of our Institutions of Learning, except Cambridge, have regular Professors of this branch, and except Princeton, in New Jersey, very few, if any, have Cabinets of Natural History, and none have a sufficient number of books treating upon this subject, to form a library. True, in the catalogues of our numerous Colleges, we always find advertised among the Faculty—

“N. N., Professor of Chemistry and Natural History,” or
 “L. S., “ Natural Philosophy and ,” or
 “B. M., “ Mathematics and .”

But, if one of these omnivorous Professors undertakes to teach both the departments affixed to his name, departments which are as different as the trades of a tan-

ner and a wig-maker, the result will always be, that the poor imposed student, after working four years for his A. B., can only say, I have learned "*Ex omnibus aliquid, et ex toto nihil.*" (A little of every thing, and nothing in the end.)

I have no intention or disposition to ridicule what is really a proper object of lamentation; but to one accustomed to the magnificent and extensive Cabinets of Natural History, which are always considered an indispensable part of the Universities of Europe, the Cabinets or Musuems of our Colleges, containing a few pebbles, the skin of a rattlesnake, the broken shoulder bone of a mastadon, and such like articles, can hardly fail of exciting a smile, even though it be accompanied with a tear of pity.

Some few years ago, the President of one of our Western Colleges, showed me their Museum, which contained many such wonderful articles as I have mentioned, and besides these precious specimens, a pair of black satin breeches, suspended by the waist and with the legs extended, like those we see hanging in front of every tailor's shop, and near by, also suspended on the wall, an old German tobacco pipe made of wood, and having a very long stem. When I expressed some surprise that such paraphernalia constituted a part of their College Cabinet, the President replied, "These breeches are the same identical ones

which General M., to whose widow I introduced you last evening, wore, when he was introduced to the royal family, in London; and the tobacco pipe is the one I once used myself, but which at the solicitation of my wife, I gave up forever, although I had previously been an inveterate smoker. These things exercise a great moral influence over the students, who can see by the first what a man can become, and by the second what he can do if he only has a firm resolution."

A very erroneous idea prevails with the managers of our Colleges, in regard to the expense of establishing a Cabinet of Natural History. A splendid Cabinet may be collected at very little expense to any institution, if they only have a competent Professor in this department. Enthusiasm in any thing, but particularly in matters of Science, is very contagious, and the students who attend the lectures of a popular Professor of Natural History, will very soon become themselves enthusiasts in this interesting department, and in all their excursions in vacation, or in the leisure hours of each day, will constantly be collecting zoological, botanical, or mineralogical specimens of all kinds, and in great abundance for the Cabinet of their Alma Mater. The very desire to know what each insect, plant, or stone is, and what its use and scientific name, will prompt them to collect every thing with which they meet, and bring it to their Professor. In this

manner, a great number of duplicates will be obtained in a very short time, and these may be sent in exchange for other specimens, by the directing Professor, to his correspondents of this and of foreign countries. If the College be situated near or in a seaport, as is the case with the Institutions of New York, Philadelphia, Baltimore, Providence, Boston, and many others, a great supply of the most curious and interesting articles may be obtained by the sea captains of such places, who, if solicited, will always be pleased and proud to collect specimens from all quarters of the world, with which to embellish the College of their native city.

No place in this Union has so great facilities for executing such a plan, as the gigantic city of New York, and I hope soon to see her Institutions setting an example, in this respect, which will be worthy of imitation. The wise Legislature of the State of New York, several years ago, expended nearly half a million of dollars for the purpose of making its inhabitants acquainted with the natural productions of the State. A costly zoological, botanical, and mineralogical survey was made, and illustrated by the publication of a precious work containing several volumes, with numerous expensive engravings, and a Museum of the specimens collected, was erected in Albany, for the inspection and instruction of the people. Each College

may accomplish the same, at vastly less expense, in the manner above described ; and our horticulture, agriculture, pisciculture, and mining operations, as well as our extensive commerce, at the present day, demand more attention to this important branch of science.

It is with much pleasure, therefore, that I learn the intention of that great philanthropist, Peter Cooper, Esq., of New York, to establish in that city, a literary institution, which will be furnished with a Cabinet of Natural History, and accompanied with the necessary instruction in Zoology, Botany, and Mineralogy, as applied to practical life.

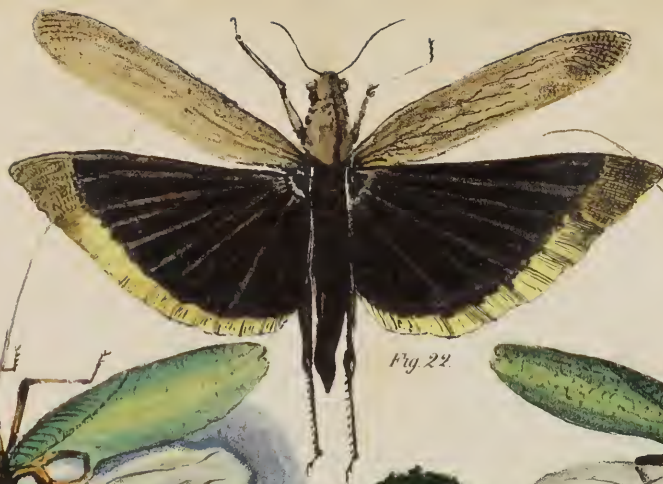


Fig. 22.



Fig. 23.



Fig. 26.

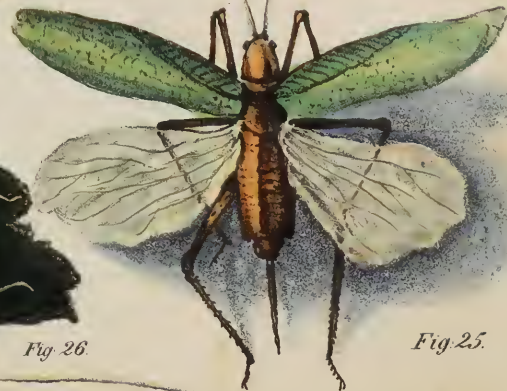


Fig. 25.



Fig. 24.

III. ORDER. ORTHOPTERA.

All Insects which have transversely moveable jaws, membraneous wings, (a few have no wings,) six legs, and undergo no metamorphosis, belong to the Order, Orthoptera, which signifies in English, straight-winged. Among these, are Grasshoppers, Walking-Leaves, Crickets, Cockroaches, Ear-Wigs, Sooth Sayers, Walking-Sticks, etc.

Grasshoppers

Have been divided, by Linnæus, into two families, viz. : Grillidæ, and Locustidæ.

The Grillidæ, or those properly called Grasshoppers, dwell, as their name indicates, upon the ground, in meadows and fields. They have short thread-like feelers, and their females are destitute of an ovipositor, but both sexes, when flying, produce a stridulating sound by rubbing their saw-like hind legs upon their parchment-like wings.

The Locustidæ, or Walking-Leaves, have very long filiform antenss. The females are provided with a long sword-like ovipositor, and the males are furnished with a spot resembling an eye of glass at the base of each wing-cover, which they rub together, and thus produce their peculiar sound. Their wing-covers, when

at rest, are disposed like a slanting roof. Their color is generally bright green, which after death, soon changes into a dingy yellow, but may be preserved by taking out the intestines of the animal and filling the abdominal cavity with cotton.

Dr. Harris, in his work on the injurious Insects of Massachusetts, and Mr. Westwood, in his "Introduction to the Modern Classification of Insects," differ from me, and call the first family Locustidæ, and the second Grillidæ, probably in order to harmonize with the English translations of the Bible.

According to my classification, an illustration of the Grillidæ is seen in the Carolina Grasshopper, *Gryllus Carolina*, Plate V. Fig. 22, and of the Locustidæ in the Katy-did, *Platophyllum Concavum*, Harris, Plate V., Figs. 23, 24 and 25.

The Grasshoppers embrace a numerous variety of different genera and species, all of which may be seen in their perfect condition at the beginning of autumn. At the same season, also, the females deposit their eggs, from fifty to one hundred each, some in holes in the ground, others fasten them with a glutinous substance upon different kinds of leaves. From these eggs proceed, in the following spring, the young Grasshoppers, which exactly resemble the perfect insect, except in being destitute of wings, and these are not developed until towards the end of summer, when they

commence their ravages among the various kinds of grasses and herbs. On account of their injury to vegetation, in many countries, premiums are paid by the public authorities for their collection and destruction. For instance, in the year 1825, the city of Marseilles in France, paid 6200 francs for collecting and destroying these noxious insects.

But again, in many countries they form an article of diet, and the inhabitants of some parts of Asia and Africa use them as food, cooking them by frying them in sweet oil, or by drying and then pulverising them, after which they are made into bread.

All the Grasshoppers, when taken, try to bite, and in so doing they discharge a brown juice from their mouth, which act probably gave rise to the idea that they were ruminant animals, like our cloven hoofed beasts, who have more than one stomach.

In some parts of France, Germany, Italy and Hungary, these insects are used as a remedy for warts, and it is said, successfully, the people applying them to the parts affected, and allowing them to bite their warts. It is not improbable that the remedy owes its successful effect to the causticity of their saliva, which may act like the lapis infernalis.

Grasshoppers are very often subject to diseases arising from the presence of intestinal worms, particularly the Hair-worm, *Gordius*, which not unfrequently causes their death.

In Germany, Grasshoppers are called "Heupferde," that is Hay-horses, because they generally feed on grasses, and their head has something of the form of a horse's head. The French call them Sauterelles, that is, Hoppers.

The *Carolina Grasshopper*, *Gryllus Carolina*, plate V. Fig. 22, is a very common insect of this Order, and is found in great numbers in the months of August, September and October throughout the United States. So numerous are they in fact, that one cannot walk across a field or meadow, without being annoyed with them, as they unceremoniously fly in your face, or alight on your arms, shoulders and head.

This Grasshopper is about one and a half inches long, and with expanded wings about three inches broad. Its wing-covers are of a dusky brown color, and its wings black with a yellow band on the margin.

But there are also found in the United States a great number of many other species, which are generally distinguished from each other by the color of their wings.

The largest and handsomest species of Grasshoppers are found in South America, one of which I will incidentally mention as it is commonly found in private entomological collections. This is the "*Grillus Dux*," an enormous insect, its wings when expanded measuring a foot, and its wing-covers beautifully colored

red and blue with black spots. The wings themselves, when not expanded, are folded together like a fan, as is the case with all other species.

But all Grasshoppers, whether handsome or not, are to be considered and classed as noxious insects.— They devour every kind of vegetation, and were it not for Nature's great law of compensation so admirably carried out in our own highly-favored country, this land would long since have been laid waste by the ravages of these rapacious insects. As it is, an abundance of majestic streams, lakes and ponds water our country from all sides, and by their evaporation afford sufficient rain for moistening the ground and making it fruitful in the production of vegetables for the support of man, as well as rendering it a fit abode for numerous Reptiles, such as snakes, turtles, lizards, salamanders, frogs and toads. Now these reptiles all feed more or less on insects, and in preference, on Grasshoppers, of which they annually destroy an innumerable quantity. Hence these hideous reptiles are the instruments made use of by a kind Providence to rid us of a greater evil. We can only form an estimate of the damage that would be done to vegetation were it not for these reptiles, by comparing our country with the immense prairie lands of the East of Europe, and several parts of Asia and Africa, which are destitute of water and trees, and where for hundreds of miles neither bird nor reptile can live, but

where myriads of Grasshoppers dwell in the height of their glory, and nothing green is spared their rapacious jaws.

It is a matter of congratulation, therefore, and an evidence of the wisdom of that gracious rule of compensation, that our gardens, fields, meadows and woods are peopled with snakes and other reptiles which feed mostly upon these destructive insects. When therefore we look with terror on the crawling serpents and the croaking frogs, and are tempted to wish their number less, it is because in their hideous forms we lose sight of their benevolent use; we forget the inexorable decree that has fixed the circle of dependence as the order of all created things; we forget that all must die that others may live; we think not of the hosts of Birds such as Heron, Bittern &c., who feed mostly upon reptiles and thereby render a superabundance of the latter impossible; we consider not that these very birds must yield themselves up as food for man, and last of all, that man in his turn must die and also be devoured by insects! Aye! and still more we forget what the open page of nature clearly shows us, that the moment we begin to live, we also begin to die, and that even while we live in all the pride of health we are the constant, daily food of the most despised insects!

But, the Grasshopper, although neither large nor terrific in its appearance, has a curious and a wonder-

ful history ; perhaps more so than any other insect. It is the same insect whose mode of life and whose ravages have excited the curiosity of Naturalists, as well as Historians in all ages. It is armed with two pair of very strong jaws by which it can both lacerate and grind its food, and although a single individual can effect but comparatively little injury, yet when the entire surface of a country is covered with myriads of them, and each one makes bare the spot on which it stands, the evil produced by them must be as immense as their numbers. So well do the Arabians know and feel their power, that one of their Poets represents a Grasshopper, saying to Mahomet : “ We are the army of the great God ! we have power to consume the whole world and all that is in it ! ”

Many ancient and modern authors have given accounts of the almost incredible injuries done to the human race by these creatures, but no one, I believe, has ever yet related that it has actually been necessary to send an army of 30,000 soldiers against them, in order to prevent their ravages. A fact which happened under my own observation and which I shall soon relate.

The earliest records we have concerning the appearance of Grasshoppers on the earth is found in the Bible, where they are mentioned as one of the Plagues of Egypt. That country was then so covered with them that the surface of the ground could not be seen,

and all the trees and herbs were destroyed by them. We find this account in the Second book of Moses, Chapter 10th. "And the Grasshoppers went up over all the land of Egypt, and rested in all the coasts of Egypt, very grievous were they. For they covered the face of the whole earth so that the land was darkened, and they did eat every herb of the land, and all the fruit of the trees which the hail had left, and there remained not any green thing in the trees, or in the herbs of the field through all the land of Egypt."

It will be noticed that I have substituted the word "Grasshoppers" for the word "locusts" as it occurs in our English version of the Bible, but I have before shown that the latter word is incorrect, and that the animal designated in Scripture was not similar to our locust or cicada, but was really identical with the Grasshopper of which we are here speaking.

According to Pliny, the inhabitants of Cirenaica, in Africa were particularly subject to the ravages of these rapacious insects, and on that account were enjoined by law to destroy Grasshoppers, in their three different conditions, three times during the year: first their eggs wherever they could be found, then their young, and lastly the perfect insect. He states also that a similar law was enacted in Lemnos, by which every person was compelled to bring a certain measure of Grasshoppers to the magistrates annually.

"In the year 591, an infinite army of Grasshoppers

of a size unusually large, ravaged Italy, and being at last cast into the sea, from their stench arose a pestilence which carried off about a million of men and beasts. In the Venetian territory also, in 1478, more than thirty thousand persons are said to have perished in a famine occasioned by these terrific scourges. In 1650, a cloud of them was seen to enter Russia in three different places, from whence they passed over into Poland and Lithuania, and wherever they moved, the air was darkened by their numbers. In some places they were observed lying dead, heaped one upon another to the depth of four feet, in others they covered the surface of the earth like a black cloth, the trees bent from their weight, and the damage done by them exceeded all computation. When the weather became hot they took wing and fell upon the corn, devouring both leaf and ear, and that with such expedition that in three hours they would consume the whole field. After having eaten up the corn, they attacked the vines, the pulse, the willows, and at last the hemp, notwithstanding its bitterness. In 1748, they were again observed in Europe, in Wallachia, Moldavia, Transylvania, Hungary, Poland and Germany, and according to the observations made at that time in Vienna, the breadth of one of those swarms was forty miles, and their length so great as to occupy four hours in passing over the city. So great also was the density of this cloud of Grasshoppers, that it totally

intercepted the solar light, so that when they flew low, the air was so darkened that one person could not see another at the distance of twenty paces.”*

The account of a traveller, Mr. Barrow, of their ravages in the southern parts of Africa in 1797, is still more striking. He says, “an area of nearly two thousand square miles might be said to be literally covered by them. When driven into the sea by a north-west wind, they formed for fifty miles upon the shore, a bank three or four feet high, and when the wind was south east their stench was so powerful as to be smelt at the distance of a hundred and fifty miles.”

In 1825, the Russian empire was again alarmed by the appearance of an innumerable quantity of Grasshoppers, of which I had the pleasure (if pleasure it may be called) of being an eye-witness.†

I left the city of Moscow in the beginning of the month of April, 1825, in order to visit the Crimea, the Caucasus and the countries lying between the Black and Caspian seas. Passing through the well cultivated States (called in Russia, Governments,) of Moscow, Orel, Rasan, Charkow, Kiew and Woronesch, the whole population of these States expressed in a

*See “Introduction to Entomology by Kirby and Spence, London, 1818.”

†See: Versuch einer Darstellung des natürlichen Reichthums, der Grösse und Bevölkerung der russischen, Länder jenseits des Caneasus von B. Jaeger, Mitglieder mehrer gelehrten Gesellschaften. Leipzig, by C. H. Hartmann. 1830. Description of the Natural Riebes, Extent and Population of the Russian Provinces beyond the Caucasus, by B. Jaeger, Member of several Learned Societies. Leipzig, 1830.

lamentable manner their fear of perishing by famine on account of the enormous quantity of the then wingless Grasshoppers which inundated the Desert Prairies between Kiew and Odessa, and between the Don and the Wolga towards Astrachan and the Caucasus, and which in the following months of May and June would have full grown wings, and would then fly in endless swarms towards the north in order to devour the luxuriant crops of the well cultivated fields, meadows and orchards of those States. I was travelling in great haste, going *about* 14 *wersts* or eight English miles per hour, night and day, (which was then considered great speed,) when I was suddenly checked in my speed in the desert prairie lands about 50 miles behind Kiew. Here the ground, as far as the eye could reach, was covered with wingless Grasshoppers, nearly two inches long, and laying piled up one upon another to the height of two feet. Of course the carriage dragged heavily as if drawn through a deep mould, which prevented the horses from trotting or even walking fast, and the revolving wheels were constantly covered from two to three inches high with mashed Grasshoppers. This state of things continued through the government of Ekatharinoslaw and Cherson to the Black Sea, a distance of about 400 miles. The sight of such an immense number of the most destructive and rapacious insects, justly occasioned a melancholy foreboding of famine and pestilence, in case they should

invade the cultivated and populous countries of Russia and Poland. And they certainly would have caused such a disaster had not active measures been taken to prevent it. It was in this instance that the Emperor Alexander sent an army of thirty thousand soldiers to destroy an army of Grasshoppers. The soldiers forming a line of several hundred miles, and advancing toward the South, attacked them not with sword and gun, but with more ancient implements, with shovels. They collected them as far as possible in sacks and burnt them. Notwithstanding this, I found on my arrival in the Crimea, in the middle of June, that numbers had escaped, acquired their wings and had already destroyed a great part of the vegetation.

But the more majestic view of one of their flying swarms presented itself to me in Asia, in the Island of Phanagoria, after having crossed the Black Sea, at Panticapacum, the modern city of Kertsch, on the Bosphorus. This Island is the residence of the Cossacks of the Black Sea, who on that account are called in the Russian language Tschernomorski, Black Sea Islanders. Soon after my arrival in that country, and while continuing my travels, I saw before me at a distance of about five miles, near the City of Tutmarakan, several thick and solid columns, arising perpendicularly from the ground, like the smoke of a volcano, which at the height of five hundred feet assumed the form of heavy, dark clouds,

which soon covered the whole sky, entirely intercepting all solar light.

These apparent clouds were nothing but swarms of Grasshoppers, which in a short time descended to the ground with a shrill, whistling noise, covering an immense area of land which a few hours before was clothed with thick luxuriant grass, and in a few moments after was as barren as a turnpike.

This species of Grasshopper is over two inches long and of a light brown color. On account of its wandering life, it was called by Linnæus the migratory or wandering Grasshopper, *Gryllus migratorius*. This is the same insect as the one mentioned by Matthew in the 3d chapter, 4th verse, where he speaks of John saying "his meat was Locusts and wild honey," and it is even now a common article of food among several eastern nations, and particularly among the Arabians.

In the United States we have a large number of different species of Grasshopper, whose characteristics are very similar, and whose ravages would be very extensive, breeding famine and pestilence if they were allowed to increase and multiply as they do in other countries. This, however, as has been remarked, is impossible as long as we have so many reptiles and birds to devour them.

The Katy-did, (Platyphyllum concavum.)

Harr. Tab. V. Figs. 23, 24 and 25.

Is one of the most conspicuous Grasshoppers of North America. In the cool evenings of Autumn its melancholy song reverberates from every tree in our orchards and forests, and its never-ceasing complaint, that Katy did, has not only suggested a thousand pleasant recollections, but has often occasioned many curious and political conjectures as to its origin and significance. I use the word significance in its most extended sense, for I know nothing in nature that is insignificant. Every voice, every sound, each warbling note that echoes in the empty air, and every act of animated nature has some deep, often mysterious meaning. To the thoughtful mind all convey some important moral lesson, either in the garb and soul of poetical association, or by the stronger and more irresistible force of example. The busy Bee, that improves each shining hour, cannot fail of favorably impressing us with the contentment and the sure success that follows patient and persevering industry. The slimy and venomous reptiles excite our disgust and abhorrence, and unconsciously teach us how to regard their grovelling similitudes. The ever constant and faithful dog that bears us company, is ever silently but surely impressing upon us the great lesson of fidel-

ity. The gentle lamb, that even "licks the hand just raised to shed its blood," shows us not only,

"Blindness to the future, kindly given,
That each may fill the circle marked by Heaven;"

But it affords us the most striking example of confiding innocence and of spotless purity. The metamorphosis of the crawling Caterpillar into the beautiful and lively butterfly, has in all ages proved a lesson of comfort and of hope to man, almost divesting death of its terrors by pointing the soul to its more glorious garb in that higher and purer ether into which it introduces him. So each animated atom of Creation bears the stamp of some great moral or intellectual significance, and appeals alike to the poet's enthusiasm, the naturalist's all-absorbing love of nature, the philosopher's burning desire to penetrate hidden mysteries, and to man's universal and unborn conviction that nought was ever made in vain.

Such reflections might be pursued through a thousand various ramifications, and assuredly prove what the contemplation of this little insect *could do*, if they do not satisfactorily acquaint us with what "Katy-did." But a facetious poet has asked this little insect tattler what occasioned its ever-lasting song of "Katy-did," and pretends to have obtained, for an answer, certain hints as to sundry interviews between a certain Miss Katy and her lover. After describing the happy interview beneath the moon-lit bower of love, and as-

surging her that he heard every word however soft and low it fell, he says—

“But never fear me, gentle one, nor waste a thought or tear ;
Lest I should whisper what I heard in any mortal ear ;
I only sport among the boughs, and like a spirit hid,
I think on what I saw and heard, and laugh out ‘Katy-did.’

I see among the leaves, here when evening Zephyrs sigh,
And those that listen to my voice, I love to mystify,
I never tell them all I know, altho’ I’m often bid,
I laugh at curiosity, and chirrup ‘Katy-did.’”

The Katy-did is nearly one and a half inches long, and its wings when expanded are about three inches wide. Its wings are of a pale green, and its wing-covers of a dark green color, which however fades away and becomes brown when the insect is dead and dried. This change of color may be prevented, as I have before mentioned in regard to the *Gryllus Carolina*, by taking out its intestines immediately after death, and filling the abdominal cavity with cotton, which is easily done by making a longitudinal incision through the under part of the hind-body with a sharp penknife.

The wing-covers are interwoven with veins resembling those of a leaf, and in the males, have a hard glassy membrane at the base of each, which is shaped somewhat like a human eye, and which being rubbed together by the sawing-like motion of their wing-covers produces the sound peculiar to this insect. The poor females are destitute of these musical organs,

and are consequently obliged to keep silence and listen to the music of their lords, but they are provided with a formidable looking sword-like ovipositor at the extremity of the abdomen, with which they pierce holes in the ground for the purpose of depositing their eggs. These eggs are generally laid in the fall, and are hatched out in the ensuing spring.

A very close and interesting observation of the conduct of these insects may be made every autumn, by putting a pair of them into a wide glass vessel, having the bottom covered with turf, which however must be sprinkled with water every day. As soon as the evening begins, the female will commence laying her eggs and depositing them in the ground, and the male will announce in loud tones that *Katy-did-it*. If you preserve these eggs in the turf through the winter, and open them in the following spring, you will find the insect in a perfect condition, except being destitute of wings. It is a very singular fact and shows the general deficiency in entomological knowledge, that numberless though they be, still very few persons can say that they have seen this handsome little insect. It dwells in trees and shrubs and usually conceals itself during the day under the leaves. I have no doubt that many, if not all have accidentally met with it, but few, except those acquainted with entomology have observed it knowing it to be the famous *Katy-did* ;

and I have often been surprised, when describing this insect to persons of intelligence who have had every opportunity of noticing it, to hear them say, I have never seen one. Its voice however has been heard by all and is very generally considered the harbinger of approaching winter.

Plate V. Fig. 23, represents the male Katy-did; Fig. 25, the female, with expanded wings, and Fig. 24 one in a sitting posture.

There are several other species in this country, all of a more or less green color, and all belonging to the same family, as, for instance, the Sword-bearer, *Conocephalus Ensiger*, with a conical head and a very long ovipositor; the oblong-leaf-winged Katy-did, *Phylloptera oblongifolia*; the narrow-leaved Katy-did, *Phanoptera angustifolia*, and several others.

But the tropics furnish many other species, which bear a still more striking resemblance to leaves, and from this circumstance are accordingly named, Laurel-leaf, Lily-leaf, Myrtle-leaf, etc.

This close resemblance has been the origin of many fabulous accounts and marvellous stories, namely, that some kinds of leaves are metamorphosed into insects, and living insects are changed into dead leaves, &c. &c.

A certain traveller, in a work on America published several years ago, related the most absurd stories in regard to these insects. He said that on this Continent

an animated insect often changes itself into a lifeless plant, by putting its feet into the ground and allowing them to take root, when they actually become the stems of a foliated plant. That leaves are sometimes changed into insects with a distinct head, throat abdomen and legs. No one, he says, can doubt these facts, as there are in Brazil thousands of witnesses who are ready to prove that they have often observed these phenomena.

Some months ago there appeared an article in several of our newspapers under the title of "Vegetable Insects," in which it is stated on good authority that there is found in Australia a caterpillar which is metamorphosed into a plant.

On closely examining the phenomena, it is found that the caterpillars of a certain Hawk Moth, in that country, dwell and feed upon the leaves of a certain tree, and that when descending to the ground for the purpose of constructing their cocoons, there actually grows out of the body of almost every one of them a vegetating plant, after which the caterpillar becomes dry and hard, and assumes the appearance of cork.—Now, I suppose this singular phenomenon may be strictly true, and in order to its explanation, it is necessary to know that fungi, mushrooms, and other vegetable productions of this tribe, have extremely fine, small seeds, which are dispersed in the air by the most sub-

tile zephyrs, and which will germinate on every vegetable and animal body upon which they may lodge, provided they find there sufficient moisture for vegetation. If they fall upon the body of the caterpillar, as is probably the case, they will germinate upon it, take root in it, and of course, in developing, will gradually destroy the vitality of the animal, and leave nothing of it, but the dried-up, cork-like body with its vegetating fungus.

The same phenomenon has been observed in the Silk-worm, which is very often subject to a disease by which its body is completely covered with a white effervescence. The real nature of this distemper was for a long time unknown, and in fact, was never ascertained until the year 1835, when Signor Bassi proved it to be a minute fungus, called *Botrytis Bassiana*, in a state of vegetation, which had by degrees occupied the whole interior of the body, and then burst through the skin.

The same kind of parasitic growths may occur on the human body, or on any animal or vegetable body, and it is probably the ignorance of these facts that has occasioned so many marvellous and absurd stories by travellers. Simple matters in Science may thus become wonderful bug-bears to the uneducated. I suppose some would hardly believe that in the tropics, a mahogany tree will gradually change into a gamboge

tree ; but this is a fact which I have witnessed, and it can be explained very easily. It is really no more remarkable than our ordinary process of grafting. The seeds of the *Clusia alba, et rosea*, a species of gamboge tree, when fully matured, burst their pods, and enclosed in a gummy substance, they drop from the tree, like so many caterpillars letting themselves down by a fine filament to the ground. If one of these trees stand near a mahogany tree, the seeds are blown by the wind, as the swing in the air, against the trunk of the latter tree, and being covered with the viscid gamboge, they adhere to its bark, take root in it, and in the course of a few years they change its whole character. The trunk and branches of the mahogany tree gradually decay and drop off, and in its stead grows the gamboge tree, trunk, branches and all.

Crickets. (Acheta.)

The Cricket has already been immortalized in the English poetry of Cowper, and although its race may become extinct, as long as the languages endure, it still must be familiar to all. Its pleasant song from June to October, during the whole season of tropical illusions, has excited much admiration in the lovers of nature for many ages ; and the pleasing reminiscences of love and of home which its chirping arouses, recently so touchingly portrayed in that admirable lit-

the tale of Charles Dickens, entitled "The Cricket on the Hearth," has thrown a charm around its life and history, perhaps never before so graphically realized. In fact, Dickens has embodied the superstitious veneration of this little insect common among the country people of many nations, when he makes his heroine say, "It's sure to bring us good fortune, John! It always has been so. To have a cricket on the hearth is the luckiest thing in the world." And Cowper did the same, years before, when he sung—

"Little inmate, full of mirth,
Chirping on my kitchen hearth,
Wheresoe'er be thine abode,
Always harginger of good,
Pay me for thy warm retreat,
With a song more soft and sweet."

There are several species of Crickets, some of which are found in every part of the world, but all resembling each other in their distinguishing characteristics. They are of different sizes and colors, according to their different species, but all have parchment-like wing-covers, and produce the sound peculiar to them by rubbing the sharp margins of their wing-covers together. Of all Insects they are perhaps the most indefatigable musicians, some of them thus fiddling with their wings from daybreak until sundown, and others from evening until the rising of the sun.

There are some Crickets which dwell only upon

trees, and bushes, and never come to the ground ; these are on this account called Tree-Crickets. Others live only on the ground, and are known by the name of Field-Crickets. Others still live in the walls of houses and are called House-Crickets.

The *Tree-Cricket*, also called *Climbing-Cricket*, *Acheta nivea*, Plate V. Fig. 26, is a very delicate insect, of a pale ivory color, with long antennes, and a short body, only half an inch in length : its wing-covers are thin, transparent, and ornamented with three oblique, raised lines.

Like the Katy-did it is often seen creeping upon the leaves of trees and shrubs, without being recognised as the little creature whose loud and shrill sound is so familiar. Only the male cricket produces this sound, which it does by elevating its sharp wing-covers very high and rubbing them together very rapidly.—The process may be distinctly seen by keeping one under a glass tumbler, and watching its movements.—They are however quite difficult to catch, as they conceal themselves behind the leaves during the day and night, and only occasionally come out of their shady abode.

In the beginning of Autumn the female makes incisions into the tender branches upon which it dwells and therein deposits her eggs. These are not hatched until the commencement of the following summer,

when the young ones come out, and attain their perfect condition about the first of August, and in southern climates even before that time.

The *Field Crickets*, *Acheta nigra* et *vittata*, are black, and so well known to every one, that a minute description of them would be superfluous. They live in meadows, and the margins of fields where the grass is not very high, and the spot constantly exposed to the sun. They select a small spot of rising ground for their abodes, which they make by digging holes into the ground, at first in a horizontal direction, and then perpendicularly downwards. They always walk into their holes backwarks, that is to say, with their hind-legs first, and while singing are usually standing before the entrance to their abodes, ready to retreat in case of necessity.

They eat grass, seeds and fruit, and with great industry carry their provisions into their holes, that they may consume them at their leisure. They are very fond of drinking, but are extremely delicate about it and will only touch the water that adheres to leaves, literally as well as poetically slaking their thirst with only the dew of leaves and flowers. In their journeys they are very careful to avoid water, and if a small stream or puddle happens to be in their way they carry pebbles into it, or grass or small pieces of wood until they fill it up so that they can pass over it with-



Fig. 31.



Fig. 29.



Fig. 27.



Fig. 30.

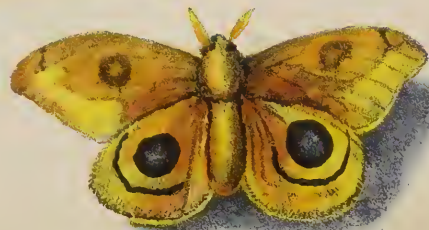


Fig. 28.

out getting wet, and this instinct teaches them to do, because if they should wet their antennæ, they would trouble them by sticking together.

Crickets, when young and before they are provided with wings, live peacefully together under stones, but as they get their growth and wings, they become great enemies to each other. The females bite off the legs of the males, and the males themselves are continually fighting with each other. If they meet face to face, they butt one another like rams, and if they meet back to back, they kick like horses.

This quarrelsome disposition of Field-Crickets may be made serviceable in getting rid of the House-Crickets, for it is only necessary to bring a few of the former into the house, or rooms, which is infested with the latter, and war will take place in the camp immediately.

The youth of Germany, however, are extremely fond of them, and there is scarcely a boy who has not several small boxes made expressly for keeping his Crickets in. They catch them by thrusting a long flexible stem of grass into their holes and forcing them out, and so much delighted are they with their music, that they carry their boxes of Crickets into their bed-rooms at night, and are soothed to sleep with their chirping lullaby.

The House or Domestic Cricket, Acheta domestica, is

smaller than the Field-Cricket, being about one inch long, and of a yellowish color. It dwells in the cracks of walls and floors, particularly in bake-houses and breweries, and wherever else they can find bread and meal, and moistened grain, for they are always thirsty, and in houses, if they cannot get a sufficiency of water elsewhere, they attack wet shoes and clothes. They are provided with wings, with which they fly from place to place, and from house to house; and there have been people superstitious enough to believe that if a Cricket flies from another house into theirs and commences its melancholly song, it is a signal of the death of some member of the family. But such superstitions are not common now-a-days; on the contrary, their presence is very generally considered an omen of good, and among country-people everywhere, the song of the Cricket is agreeable and highly prized.

It is a true remark, that the deepest emotions are those most noiseless. When the patriot La Fayette visited this country many years ago, he was received with distinguished applause and parade, wherever he went; the citizens of every city and village through which he passed, exerted themselves to the utmost to do him honor, and the country resounded with the merry ringing of bells, with the trumpet of jubilee, and with the booming cannonade. But the greatest compliment paid him, and that which affected his noble

heart most deeply, was in a little country village, in which there was no band of music, no firing of guns, no soldiery, no parade, but at the entrance of which, the inhabitants met him with uncovered heads and waving handkerchiefs, as he passed under the arch they had erected over the road, and which bore this inscription,

“Come then, Expressive Silence, muse his praise !”

And so it is not the mind of man, generally ; anything that excites the powerful impression of awe or amazement, on the yet more touching and inexpressible feelings of the heart, produces a profound and speechless silence. Lovers and friends, old men and little children, sit silently together for hours looking at each other, in rapt admiration, their souls mingling and blending together, conversing telegraphically with each other in tones that human tongues cannot utter, because only human words can dwell on human lips, but the spirit sits above the tongue and has its own peculiar language, which it alone knows how to express. Something of this effect seems to be produced by the chirping of the domestic cricket. People, whom the world call brainless, those who cannot claim a spark of romance, or poetry, as well as those in whom the intellectual fire burns brightest, seem very generally to be calmed into silent, pensive, meditative thought by the mere sound of this little insect rubbing its wings

together ! What there is in the sound that is attractive, or why it produces such effect, is more than any one has tried to fathom, but the fact is acknowledged by all, and there are few who will not say with Cowper—

“ Though in voice and shape they be
Formed as if akin to thee,
Thou surpassest, happier far,
Happiest Grasshopper that are.
Theirs is but a summer’s song,
Thine endures the winter long,
Unimpair’d, and shrill, and clear,
Melody throughout the year.

Neither night, nor dawn of day,
Puts a period to thy play ;
Sing then—and extend thy span
Far beyond the date of man.
Wretched man, whose years are spent
In repining discontent,
Lives not, aged though he be,
Half a span, compared with thee.”

The *Mole-Cricket*, *Acheta Gryllotalpa, brevipennis*, is larger than either of the three species, being about two inches long, and distinguished from the others by having very wide mole-like fore feet, very short wings and short hind legs. Its body is of a grayish color, and its feet are brown.

From the peculiar construction of its fore feet it may readily be inferred, that it acts in the same manner under ground as the mole, and so it does—it feeds

on the roots of plants, and is sometimes very injurious to our gardens and meadows. This insect is scarcely ever seen above ground, but its presence may easily be detected by the withering blight that marks its subterranean ravages. We frequently see large spots of grass in our meadows becoming yellow, and drying up, because its roots are devoured by the Mole-Cricket, which dwells under it. These insects would prove much more annoying and injurious to us, were they not constantly being destroyed by moles, lizzards and snakes.

Cockroaches. Blatta.

The *Common Cockroach*, *Blatta orientalis*, has been so universally known in the Old and the New World, for ages, that it is almost impossible to ascertain whence it first originated. Suffice it to say, that it has a flat body, about an inch long, of a dirty yellow or black color, and long awl-shaped antenns, each of which is composed of eighty joints.

Cockroaches, as is well known, are very voracious, and devour every thing that comes in their way, and as they are at the same time very prolific, they should always be destroyed when encountered. This may be done by pouring boiling water upon them, or suffocating them with sulphur smoke. Many houses in St.

Petersburg have been so infested with them, that it has actually been necessary to burn them down, in order to get rid of these noxious insects.

Ear-wigs. Forficula.

The *Common Ear-wig*, Forficula Auricularia, is about one inch long, and has yellowish legs and a brown body. Its upper wings are very short, but the under ones are as long as the whole body, and will expand like those of a Butterfly, making it seem almost impossible that they can be so folded up as to have room enough under their short wing-covers.

These little animals present one very extraordinary phenomenon among insects; they are not only oviparous, but they bring forth their young by incubation; and during the month of April, the females may already be found under stones, sitting upon their eggs like a hen. The young are hatched like chickens, and in the month of June, may be found with their mother, resembling her entirely, with exception of the wings.

It has long been a prevalent popular superstition, that the Ear-wig creeps through the ear into the brain of sleeping persons, and thus occasions their death. But an instance of the kind has never come to light, and we can easily believe it impossible, as their jaws and abdominal pinchers are not strong enough to ad-

mit of their doing any such injury. They are, however, justly persecuted and destroyed by gardeners, because they make holes in ripe fruit, as peaches, apricots, pears, and prunes, and feed on them. They are also, very prone to conceal themselves in pink flowers and dahlias, when in full bloom, and spoil them. On this account, gardeners often suspend lobster shells, reeds, &c. on these plants, that the Ear-wigs may conceal themselves in them instead of the flowers.

The Soothsayers. Mantis;

Are distinguished by an unusually long, flat hind-body, a perpendicularly erected long necklike thorax, short, horizontally folded, generally green, or grayish brown wings, two very long fore-legs, which are continually stretched out to catch insects, and two short antennæ.

They have received the name Mantis, from the Greek word signifying Soothsayer, on account of their curious motions, and that of Camel-Crickets, from the great length of their neck.

They are very seldom found in the middle or eastern States of the Union, but are seen in Maryland and all the southern States, and several species are found in the tropics.

They dwell upon the leaves of trees and bushes,

walking very slowly upon their four hind-legs, or sitting stationary for hours, like the chameleon, waiting for their prey. As soon as they perceive a fly or a caterpillar approaching, they turn their heads on all sides, watching its movements, then they creep towards it slowly like a cat after a mouse, until with the rapidity of an arrow, they pounce upon it, and grasp it with their sharp-pointed fore-feet. Having devoured their victims, they resume their former position, and sit stationary holding up their forelegs as if in the attitude of prayer. Hence, the country people of France, assuming that it is engaged in prayer, call this insect "Prie Dieu," the Italians, "Prega Dio," the Germans, "Gottes-Anbeterinn," and the Latin names of "Mantis religiosa, precaria, sancta, superstitiosa, oratoria, mendica, pauperata," &c., which have been applied to it, are derived from the same superstition.

In the life of the celebrated missionary, St. Francis Xavier, we read "that when he saw a Mantis holding up its arms in deep devotion, he asked the insect to sing the praises of God, whereupon it chanted a very fine canticle."

Francis Xavier, styled the Apostle of the Indies, was the son of a noble family, and was born in 1506, at the castle of Xavier, in Navarre. A friend of Ignatius Loyola, he early joined the order of Jesuits and went to the eastern coast of Africa as a missionary ; from

there to Goa, Molucca, and Ceylon ; thence he went to Japan, translated the gospel into the Japanese language, preached, converted, and baptized innumerable numbers, often at the imminent peril of his life. By his extraordinary successful efforts, Christianity flourished wherever he went ; in the island of Ormuz, at Cochin, Coulon, Bazain, in the Moluccas, Ceylon, and in all the stations this side of the Ganges. He died in a ship on the Chinese coast, in the year 1552, being only forty-six years old, and was soon afterwards canonized by the Pope of Rome.

Sparmann, a distinguished traveller in Africa, informs us, " that this insect, the Mantis, is worshipped by the Hottentots, as a tutelary divinity, and if it happens to alight on any person, he is at once considered as the peculiar favorite of Heaven, and is looked up to as a saint."

In what a different light does the Naturalist look upon the Mantis? This cowardly and cruel insect, which is itself afraid of a little ant, can only be regarded as in the attitude of those whom the poet describes, as

"Borrowing the livery of Heaven, to serve the Devil in," if its position may be allowed any practical association at all. It holds up its anterior tibiae merely for the purpose of catching and destroying flies, caterpillars, plant-lice and other luckless insects who may come within the reach of its forcep like fore-feet.

These insects, according to the observation of all naturalists, are very warlike, voracious, and did our limits allow, we should quote many very interesting accounts of them from the works of that eminent German Entomologist, Roesel. Like Reaumur, in France, he was occupied the greatest part of his life in making observations concerning the life, habits, manners, use, and injury of insects, and published the result of his labors in four volumes, from 1746 to 1761, under the title "*Insecten Belustigungen*," entomological amusements. Roesel was born in Germany in 1705, was a contemporary of Linnaeus, Buffon, Tournefort, and Jussieu. In the early part of his life he practised miniature painting in Nuremberg, but afterwards devoted himself entirely to the representation of insects, which he drew from nature with uncommon accuracy. He then wrote his valuable and classical work on that branch of Natural History, and illustrated it with plates. He died in 1759.

To witness the warlike disposition and cruelty of these soothsayers, it is only necessary to put several of them in a box together, when they will immediately commence fighting, furiously striking at each other with their long fore-legs. The males are considerably smaller than the females, and in these encounters generally fall victims to the voracity of their "better-halves," who cut off their heads and then devour their whole body piecemeal.

The Chinese, aware of their cruel and warlike propensities, keep these insects in bamboo cages, and exhibit them as prize-fighters, as is done with fighting cocks. At these exhibitions, when two Soothsayers are placed face to face, they become at first still and immovable, but after they have gazed fixedly at each other for a while, they raise their wings, their whole body begins to tremble, they become furious, and pounce one upon the other, giving blows with their long fore-legs, which they use as if they were swords, and fighting as fiercely as the enraged Hungarian Huzzars in the last war with Austria. At last one of them yields, and the conqueror grasps the vanquished one, and devours him by pieces.

The eggs of the Soothsayers, in the autumn, are deposited in an oval mass attached to the twigs of some creeping vines, near its base. This mass is enclosed in a silk-like covering, resembling a seed pod, which contains from fifty to one hundred eggs, and which remains in this condition during the winter, like the cocoons of butterflies and moths. In the beginning of the following summer, the larvæ issue from these eggs, and exactly resemble the perfect insect, except in being destitute of wings. If these are kept in a glass together, they will soon exhibit the warlike disposition of their parents, and devour one another, unless they are abundantly fed with plant-lice, of which they are very fond. On this account, notwith-

standing their fierce, and quarrelsome disposition, they become indisputably useful in destroying noxious insects.

The life of the Soothsayer continues scarcely two seasons. It is hatched at the end of spring, becomes perfect in the course of the summer, and dies generally towards the end of October.

The Walking-Stick. Spectrum.

The *Walking-Sticks* as this English name indicates, are very fantastically formed. They are straight longitudinally, like the stem of a pipe, slender, and some of the tropical species are more than a foot long.—They are the largest in proportions of the whole class, and on account of their length, may be considered the whales among insects.

They somewhat resemble the Soothsayers, but their fore-legs are not sabre-like, nor adapted for catching insects. They are not carnivorous but herbivorous, and are destitute of wings, and although they feed on plants, they are not injurious to vegetation, because they eat principally useless weeds, and the juices which issue from trees. Their antennæ and legs are very long, and always extended, and as their bodies are of a gray or yellowish and brown color, it is often difficult to discover them, or to distinguish them from the branch on which they stand, as the insect is often

motionless, with the legs extended in a straight line resembling the lateral twigs.

In my excursions I have never met the Walking-Stick farther north than Maryland and Virginia, where I have seen them in great quantities, in the month of September, either standing motionless on the twigs of trees, or on the rails of fences, and at my approach, they invariably took the opposite side of the twig or rail in order to evade observation.—The Hon. Prescott Hall, of New York, however, recently informed me that he has observed them abundantly at his summer residence, in Newport, Rhode Island.

The late Thomas Say held the same opinion that I did, and believed this animal to be only indigenous in the Southern States, until he was corrected in this respect by Mr. Chas. Pickering, of Salem, Mass., who informed him that he had obtained one near that city.

These insects are mostly all exotic, and according to Westwood there are found in the south of Europe, three species ; in South America, twenty species ; in North America, three species ; in Asia, forty species ; in Australia, twenty-seven species, and in Africa two species.

Mr. Say, in his American Entomology has given a good illustration of the *Spectrum femoratum*, in plate 37, and of the *Spectrum vittatum* in plate 38, to which I refer the reader.

It is much to be regretted that death has taken from us this highly distinguished American Naturalist, but his works are left behind him, and will insure him long remembrance among all lovers of Science and Nature. Mr. Say accompanied Major Long in his exploring expedition to the Rocky Mountains many years ago, and afterwards travelled with Mr. McClure through Florida and other countries.

He published his *American Entomology* in 1824, in three volumes, with fifty-four very well executed colored plates, and is the author of a great number of valuable articles contained in the *Transactions* of several of the learned societies of the Union.

Thomas Say was a member of the Society of Friends, Curator of the American Philosophical Society, Professor of Natural History in the University of Pennsylvania, and of Zoology in the Philadelphia Museum.

IV. ORDER. LEPIDOPTERA. Moths and Butterflies.

We now approach the most beautiful, and to the generality of people, the most interesting department of Entomology. The splendor and variety of the Insects of this order, has never failed to attract attention, and with all lovers of Nature nothing more readily or more universally excites the mingled emotions of pleasure and astonishment, than the careful examination of a rich collection of Moths and Butterflies. At the sight of these, all seem to feel and confess, that "varietas delectat," variety is charming. The endless diversification of colors, which are distributed in different forms upon the bodies and wings of Lepidopterous insects, and even upon the bodies of caterpillars, some in lines, others in circles, or eyes, or hieroglyphics, or letters, and all in even varying shape and hue, cannot fail to excite our admiration, and impress upon us the conviction, that even the most diminutive creations bear the same stamp of pleasing and infinite variety, which pervades the universe. Of all the glittering orbs that roll in endless space, probably no two are alike in form, or substance, or living contents. So of all the myriads of living creatures with which the earth has swarmed since the animating spirit first breathed upon chaos, no two can be said to be pre-precisely alike; but on the contrary, so inevitable is

the law of variation, with regard to all the operations of Nature or Art, that all similarity is rather relative than real. The animal, the vegetable, and the mineral kingdoms in all their developments, show the same endless diversification. In the human family, even, the highest and most perfect of animals, we see multitudes of different forms and colors, of languages, and manners and customs. We find an immense variety of beasts and birds, reptiles, fishes, and insects; and the same of plants, trees, and shrubs, as well as of all the mineral productions. And yet we find all these different varieties of the three natural kingdoms united under one general law; all dependent upon one another, as component parts of one great universal whole, and we are forced, with the great philosopher, Humboldt, to exclaim, "Nature is the unity in variety."

Moths and Butterflies, in comparison with the other orders of Insects, are well entitled to the rank of nobility, for among them we find no impudent beggars and spongers, as among the Flies; no parasites as in some of the wingless insects; no working class as among the Hymenopterous insects, bees, wasps, ants, and gall-flies; no musicians as among the families of Crickets, Grasshoppers, Katy-dids and Cicadas; but all of them are aristocratic idlers, who, clothed with silver and gold and purple, and ornamented with ever varying splendor, have nought to do but to seek

their own pleasure, and charm away their brief existence fluttering from bough to bough, and satiating themselves with the sweet nectar of flowers.

And, indeed, whether we look at them in their infancy as caterpillars, or in the state of chrysalis, or in their perfect condition, they are always more beautiful and more interesting than all other insects, and attract more of our attention, when in the state of caterpillar, on account of the injury they do to vegetation, and when in their perfect form, on account of their splendor and variety.

Moths and Butterflies are distinguished from other insects by having four expanded wings, with a few exceptions, covered with colored scales, and hairy bodies. They are oviparous animals, and under the guidance of their instinct, lay their eggs upon those plants, which are best adapted for sustaining their future progeny. From these eggs proceed the caterpillars, (larvae,) many of which are so voracious that they consume more than twice their own weight in twenty-four hours. We may congratulate ourselves that they are so small, and that we and our domestic animals are more moderate in our appetites, for if a man weighing one hundred and fifty pounds, consumed every day three hundred pounds of food, or an ox weighing four hundred pounds devoured daily eight hundred pounds of grass, our terrestrial globe could not, in its

present condition and extent at least, produce sufficient nourishment to sustain us, or them.

After it has attained its full growth, the caterpillar stops eating, casts its skin and becomes a chrysalis or cocoon (Pupa.) Some suspend their cocoons from the branch of a tree, as for instance, the *Asterias*, others bury themselves in the ground, as do all the Hawk-moths, and in this condition remain throughout the cold winter season. Thus the chrysalis passes its life in a state of torpor, without eating or moving, until after a shorter or longer period it bursts its skin, and the perfect butterfly, or moth, issues, no more to injure vegetation, because it has exchanged its mouth for a spirally rolled tongue, with which it can only suck the juices of plants and flowers.

In this metamorphosis, some very great changes occur in the appearance and beauty of the insect, as well as in its form and structure. Some of the handsomest caterpillars issue from their cocoons the plainest, even the ugliest looking butterflies, and vice versa. Thus the potatoe-worm is remarkable for its beautifully variegated colors, but when it becomes adult as a hawk-moth, it has a uniform dingy gray color. But the contrary is often the case, and an insignificant looking caterpillar is as often metamorphosed into a very handsome butterfly.

Such changes, however, are not confined to insects, but are also common throughout the animal kingdom,

as well in the highest as the lowest classes, and would seem to be something more than a mere freak of nature. The daughter of a hair dresser, in Paris, on account of her extraordinary merits, was made by Louis XV., Duchess of Dubarry, with an annual income of a hundred thousand dollars, and the same individual when eighty years old, was brought on a butcher's cart, clad in rags, to the scaffold where she was beheaded. Catherine I., reigning Empress of Russia, who knew not how either to read or to write, was in her youth a servant girl. And so hundreds of others who began life in obscurity have ended it in the highest stations of wealth and rank.

But the metamorphosis of Butterflies and moths, has always been a subject of interesting contemplation, and of profound analogical reasoning, and has ever been considered the true type of man's existence here, and his brighter and happier life hereafter. In the most ancient times, it probably gave origin and strength to the belief in the transmigration of souls, metempsychose, as also to a thousand fabulous stories and fairy tales, in the same manner as the annual casting of the skin of snakes, by which process that reptile appears every spring in a new dress of bright and glittering colors, has given rise, even in the remotest antiquity to the idea of regeneration, and endless life hereafter.

Caterpillars, notwithstanding their beauty, are very

generally despised on account of the immense injury they do to vegetation, but the prevailing prejudice against them, in my opinion, arises more from the general ignorance of their uses, and the benefit they are capable of conferring upon man, than upon the actual amount of damage done by them. We will mention some of their uses, and again endeavor to convince our readers that none of the works of nature are so insignificant as to be wholly without use in the great plan of economy.

Caterpillars very often inform us as to the properties of the plants upon which they feed; thus the potato-worm, *Sphinx Carolina*, feeds only upon the different species of the night shade tribe, (*Solaneae*), for instance, on the egg-plant, the potatoe and tomato vine, &c.; the *Asterias* (*Papilio Asterias*) lives upon the leaves of the umbrella tribe (*Umbelliferae*); as the parsnip, cicuta, parsley, caraway, anise, celery, &c.; and the *Danaus* (*Danaus Plexippus*) feeds only upon the different species of milk-weed.

The excrement of caterpillars furnishes an excellent dye-stuff, and their bodies the finest of varnish. It is well known that the body of each caterpillar is provided with a glutinous substance by which they are enabled to manufacture their cocoons, and to obtain this they are collected in many countries in large quantities and boiled in water until a greasy liquor is seen floating upon the surface. This oleaginous

substance is skimmed off and proves a valuable varnish. I was told that the Japanese use this to varnish their finest fancy articles.

Raising caterpillars for the purpose of obtaining from them perfect butterflies or moths, is not only an agreeable and instructive operation for young pupils in their leisure hours, but it has often been a very lucrative business. In Altona, in Denmark, I became acquainted with a gentleman who raised in his conservatory several species of the large moths, natives of North America, as the *Cecropia*, *Luna*, *Polpyhemus* and *Promethea*, which he sold readily at two dollars apiece, and of which he raised on an average a thousand specimens a year.

Caterpillars are of quite an important use to man, as the principal food of birds, and the amount of good they do in yielding up their lives as nourishment for others, would astonish one unaccustomed to reflect upon the subject, and really goes far towards compensating the injury they do to vegetation. There are at least 1200 species of Lepidopterous insects in existence, and as each female lays on an average three hundred eggs, half their number, viz.: 6000 females will produce 1,800,000 caterpillars, in the second generation, 180,000,000, and in the third, 27,000,000,000.

If such an immense multiplication of so voracious an animal were to be continued without any check,

man and beast would soon be destroyed by starvation, but it is undoubtedly one of the designs of nature that these should increase immensely for the very purpose of furnishing sufficient nourishment for the birds and other winged animals which make them their principal food. It is ascertained that a single robin or woodpecker, and many others of the warblers, carry every day about fifty grubs or caterpillars to their nests as food for themselves and their young.

Now if there were only one million of these birds of which each one devours 6000 caterpillars during the months of April, May, June, and July, by no means a large computation, the number of caterpillars and grubs thus destroyed will amount to 6,000,000,000 annually.

Caterpillars are therefore of great use to us in furnishing so abundant food and nourishment for the birds, which enliven and embellish the country with their happy songs and their beautiful plumage, and which themselves supply us with a palatable and delicious article of food.

Caterpillars are also destroyed by various kinds of vein-winged insects, which are not so useful to man, principally by different species of the Ichneumon fly, which with her ovipositor thrusts one or several eggs into the body of the caterpillar, upon the flesh of which the maggots of these flies subsist, until they come out as perfect flies, of course destroying the

larvæ upon which they feed. We can often see this process carried on upon the body of a potatoe worm, when it is full grown and just ready to change into a cocoon. It will be completely covered with many hundred minute white silk-like bodies, which look like grains of rice, but which are nothing but the cocoons of small Ichneumon flies, which have been raised in the body of that caterpillar, and work themselves out of its skin when ready for their own metamorphosis into a cocoon. This change takes place very rapidly and then they fall to the ground to await their final transformation into a perfect Ichneumon.

Lastly, caterpillars are not only indirectly useful to man, but they are directly of the greatest importance to him; they not only indirectly furnish him with palatable food, but they directly supply him with his costliest and most beautiful apparel. What a rebuke for human pride! The gaudy and spangled robes that deck earth's greatest potentates are originally woven by the despised worm that crawls beneath their feet! What a profound lesson in the economy of nature, and how striking an illustration of the dependence of all created things! An apparently insignificant caterpillar becomes one of the most important articles in the manufacture and commerce of the world. An infant butterfly weaves its own beautiful colors, into a texture that becomes not only the splendid and appropriate ornament of female beauty,

but also the insignia of office, rank and power. The academic gown, the priestly vestments, and the monarchs' royal robes, were all once enclosed within the chrysalis of a silkworm.

This caterpillar is the most renowned and the most profitable of all, and is extensively cultivated in France, Italy, Greece, Turkey, Persia, China and Transcaucassia,* and might as well be cultivated in this country, if the importation of foreign silk and the tariff did not operate against this branch of industry. We have, however, quite a number of Moths, indigenous to this country, the cocoons of which might also furnish a very valuable, strong and excellent silk, and of which extensive use will probably be made as soon as the young giant of North America arrives at maturer age. Of these I shall speak at length in some of the following pages.

Various kinds of apparatus have been invented for the purpose of raising caterpillars, and the simplest kind are boxes, the bottom of which is covered with earth, and the top with gauze, so as to admit of fresh air at all times. In some places large cages, like those for birds, are used, which are also covered with gauze, and in which are placed the different plants upon which the caterpillars feed. This is a very convenient contrivance for observing their mode of living, the casting of their skins, and their metamorphoses, as also

*See: "B.^f Jaeger's Versuch einer Darstellung des natürlichen Reichthums der russischen Länder jenseits des Caucasus. Leipzig, 1830.

for obtaining handsome and perfect specimens for the cabinet. They may be raised, however, in the same manner as silk-worms are generally raised and which we shall presently describe.

As soon as the cold of autumn deprives the trees and shrubs of their foliage, all caterpillars disappear, either metamorphosing themselves into cocoons, or if not yet ready for such a change, concealing themselves under the ground. In the following spring as soon as the new leaves appear on the trees, they come out from their caverns in the hollow trees or the crevices of the rocks, and with a host of new ones that issue from the eggs which were deposited in the previous autumn, they commence their ravages, devouring all the new leaves and shoots within their reach.

After the caterpillars have cast their skin several times and are full grown, they metamorphose themselves into an immovable cocoon, (*chrysalis*, *aurelia*, *pupa*) which eats no more, and under the horny skin of which may almost always be recognised the wings and other members of the future butterfly or Moth. Many of these come out after a few weeks, during the summer, again lay their eggs from which proceed other caterpillars, which latter generally pass the winter as cocoons, exposed to rain, snow and the severest cold without the least injury.

A few butterflies, however, are not unfrequently

seen on warm sunny days in the middle of winter, as for instance the Painted Lady, (*Vanessa cardui*), or the Mourner's Mantle (*Vanessa Antiope*.) These individuals came out from their cocoons late in the fall, and made their winter quarters in hollow trees.

As the habits and mode of life of Moths and Butterflies, and even their forms and organs are quite uniform, while on the contrary those of their caterpillars are very manifold and diverse, the careful observation of the latter seems to offer greater satisfaction to our curiosity, and I deem it important to speak more at length concerning them.

Caterpillars have two kinds of feet, viz. : three pairs of horny ones under the neck, and a number of fleshy ones under the remaining parts of their body. The greatest part of these insects have eight pairs of feet, some genera seven, others six, and others only five, or even four pairs of feet. Those that have eight pairs of feet walk very slowly and uniformly on the ground, but all that have less than that number walk differently; they cannot progress with their body extended horizontally, but when creeping forwards form an arch with the middle part of the body which is destitute of legs, by approaching their hind feet to those of the thorax, and then advancing with the forepart of the body in the same manner as we move the hand when measuring a span with the thumb and forefin-

ger. On this account, these caterpillars have been called by the common people, tailors, and by others, geometrae, or surveyors. Those caterpillars which have only four pairs of feet, are able to stand erect on their hind feet for hours, forming an acute or a right-angle, and in this motionless position resembling a little twig of the shrub or tree upon which they are standing.

Caterpillars are generally covered with very handsome colors, and even the plainest looking will appear handsome upon a close examination with a magnifying glass. The size of their bodies varies very much in proportion to the size of the perfect insect, and their exterior surface is either smooth, as that of the *Asterias* on the parsnip, Plate VI. Fig. 30, or that of the *Danaus* on the milk-weed, or it is hairy like that of the *Saturnia*, Plate VI. Fig. 27, on Indian Corn and other grasses.

The food of caterpillars, with a few exceptions, is taken from the vegetable kingdom. Some feed exclusively on one species of plant, as the silk-worm on the white mulberry: others on all the species of one genus, as the potatoe worm on the tomato, potatoe, &c.: others eat any kind of vegetable, as the woolly-bear, (*Arctia*.) The periods of taking their meals is also different; some eat only in the morning and evening; others during the whole day, and others only at night

while they conceal themselves during the day, and their depredations only are visible. But if by night we examine our cabbage, cauliflowers and turnips with a lantern, we shall often find them covered with a host of these noxious individuals.

Many of the caterpillars live like hermits, a solitary life, and pay no attention to their brothers and sisters, whilst on the contrary, many species are real socialists, and build in common their comfortable silk dwellings, with which, if not prevented by man, they sometimes cover entire trees. Here they live, and feed together at regular hours, as for instance, the tent Caterpillar (*Clisiocampo americana*, Harris,) on apple, pear, or cherry trees, and by such confraternities the trees of an entire orchard are ruined, unless the destructive intruders are destroyed in April or the beginning of May.

Single parts of Caterpillars.

Head.—The head of a caterpillar is horny, of a globular or oblong form : it contains a mouth with an upper and under lip, between which are sharp horny jaws, with which they cut transversely the leaves, beginning at the margin. They cut with their jaws as easily and in the same manner as we do with scissors.

Although we cannot distinguish in them any organ

of vision, it is more than probable that they are provided with eyes: for if we examine them with a magnifying glass we discover on each side of the head six black spots in a circle, which seem to answer the organ of sight, and if we approach them in the night with a light, they immediately begin to move, which shows that they must have some means of being affected by the light. Besides, their motions in various voluntary directions, testify much in favor of such an opinion, although it is possible that these may be detected by their exquisite sense of smell.

There is no caterpillar which does not spin a web of some kind, by issuing a thread from a fleshy point of the under lip.

Body.—The body of a caterpillar consists of twelve ringlets, upon nine of which, on each side of the ventral portion of the body, is seen an oval spot, surrounded sometimes with a red or yellow ring. These oval spots are the respiratory organs by which the insect breathes. That these are the real respiratory organs is proved by putting oil or any greasy substance over these air-holes, the consequence of which will be immediate death by suffocation. Moreover, if a caterpillar is put under water or alcohol, air-bubbles will be seen issuing from innumerable minute holes, in all parts of its body, and when the skin is taken off from the insect and held up against the light, the holes may

be distinctly recognized, and the whole skin will appear as if it were perforated with an immense number of fine pricks.

Inside of the body, every caterpillar has a stomach, a heart, an intestine, and two long serpent inctubes, which extend to the hind part of the body, and thence back to the neck, where they open at the inferior lip. Those tubes contain the substance which the animal uses in spinning, which is a yellow or white juice, according to the food it takes, and upon this also, probably depends the fineness of the silk they make, in the same manner as the quality and color of butter depends upon the food of the cow.

These tubes joining together and opening at the under lip, constitute the spinning apparatus of caterpillars, and may be distinctly seen by opening with great care and caution, the back of the animal. The juice contained in the tubes is nothing more nor less than a kind of very fine varnish, of which the people of some countries make use, but which no one has yet undertaken to use in this country. Should this varnish ever come into general use, our most noxious caterpillars would become beneficial to us.

The *single parts* of Moths and Butterflies, although not quite as varied and complex as those of caterpillars, still present some points of interest and curiosity, and far excel them in beauty and splendor.

The *four wings* of *Moths* and *Butterflies* differ from those of other insects, by being covered with a kind of dust, which produces the handsome colors, and which, when touched, sticks to the fingers. Under the microscope, it is seen that this dust has regular forms, and consists of horny scales, fastened in the wings. From this circumstance, the order of entomology comprising *Moths* and *Butterflies*, is called *Lepidoptera*, which signifies, in English, scale-winged.

The *head* of these insects is provided with two large globular eyes, covered with a horny skin, which under the magnifying glass, looks like a network, consisting of a number of elevated points or convexities, of which each one may, perhaps, be considered a single eye. This horny skin is transparent, and when taken off and looked through, for instance, at one man, there are presented to us a whole army of Lilliputians. But in spite of this multifarious vision, the insect probably sees only that object which is in the direct angle of vision, or which is in a straight line with its point of sight.

On the upper part of the head, between the eyes, are seen two thread-like filaments, called "feelers," antennæ, as in the *Saturnia Io*, Plate VI., figs. 28 and 29, and in the *Asterias*, Plate VI., fig. 31. The use of these organs has not yet been exactly ascertained. Some Naturalists think that these feelers serve to protect

the eyes, but the more rational opinion prevails, that the antennæ, with which all insects are provided, are probably, the organs of hearing. They are hollow, provided with muscles, and placed on each side of the head, like the ears of beasts, reptiles, and fishes.

The use of the proboscis is much better known : it is a spiral tongue, formed to coil up like the spring of a watch, and it is by means of this organ that the insect is enabled to pump out the juice of flowers. This spiral tongue, which answers the purpose of a mouth, is placed between the eyes, and consists of two lateral halves which are closely united and which form a hollow tube like the proboscis of an elephant. Its length varies considerably in the different species of butterfly. We find the longest ones in the Hawk-Moths, but a few species have none at all, as the silkworms, for many live as perfect insects only a few days, and can get along without the trouble of procuring food.

I have often amused myself with experiments upon the Hawk-moths and Butterflies which were hatched in a warm room as early as the month of March. I have fed them with sugar, holding the insect in my fingers by the wings, and have seen them seize the piece of sugar with their fore feet and thus holding it unfold their proboscis, and with its saliva moistening the sugar, then sucking the juice which could easily be perceived ascending the trunk. This is an experiment which every one can make at pleasure.

From the most ancient times, it has been observed, that some Lepidoptera make their excursions only during the night, and conceal themselves during the day; whilst others are seen flying about only in the day time, and conceal themselves at night. The former are called Nocturnal Lepidoptera, as Moths, Millers, Hawk-Moths, etc., which are recognised by their having antennæ without a knob at the end, e. g. the *Saturnia Io*. Plate VI. figs. 28 and 29.

These insects are rarely seen by day, being concealed on or under fences, or houses, or under the leaves of trees and bushes, and you have only to strike upon a bush with your walking stick, or parasol, (for I write also for the young ladies,) when a swarm of these insects will sometimes fly out of it, and be easily caught in a net. As soon, however, as night sets in, their airy promenades begin, and unless snapped away by the cruel whip-poor-will, or a voracious bat, or burnt alive by the flame of some candle, they continue flying about all night.

It is very singular, that nocturnal insects, which conceal themselves from the day light, are so apt to fly towards a light in the night. But such is the fact, as almost all can testify, who have seen them flying around a light in a warm summer evening, when the windows are open, until they disabled themselves, so that they could not fly. This is another way of catching these insects, and still another is to spread a white

sheet over the turf of your garden in a warm summer evening and set a lantern in the midst of it; numerous swarms of guests of all shapes and colors will immediately appear upon it.

But if we examine these insects which are so much attracted by the light, we find the greatest part of them males. Hence, the celebrated and ingenious Professor Oken thinks that the females of the nocturnal Lepidoptera may, perhaps, be provided by nature with some luminous spots, visible only to their males, but not to man.

The Diurnal Lepidoptera, called Butterflies, are seen flying only during the day time, and are distinguished from the preceding ones by having a knob at the extremity of each antenn, as for example, the Asterias butterfly, (*Papilio Asterias*.) Plate VI., fig. 31. Of these we shall speak again.

Of Nocturnal Lepidoptera.

The romantic imagination of Naturalists has often taken from ancient mythology, the names of gods and goddesses, or of fabulous heroes and heroines, with which to distinguish the most splendid of the lepidopterous insects. Thus we have among them, an Apollo, Mars, Cybele, Iris, Atropos, Ulysses, Ajax, Nestor, &c. This was the case with the first Nocturnal Moth of which I shall speak.

In the months of June and July, if we look on the dogwoods, elms, sassafras, or poplars, we find upon their leaves a number of small pale green caterpillars, covered with clusters of light green short prickles, and having a brown and white longitudinal stripe on both sides of the lower ventral part of the body, and extending from the head to the abdomen. These caterpillars live together very sociably during their infancy, but disperse at mature age, and travel about through meadows and gardens, where they are often found upon the leaves of clover, Indian corn, and other grass-like plants, upon which they feed.

One of these caterpillars is represented in Plate VI. fig. 27, and when full grown is more than two inches long. Its fine colors attract many a young person, who soon finds himself affected to tears by the sharp pains of its prickles, which sting like nettles.

It is easy to raise these caterpillars, as their food can so easily be procured, consisting of elm and poplar leaves, or any kind of grass. After having cast their skin four times, and when they are about seven or eight weeks old, each one looks out for a large leaf on the ground, the margins of which it fastens together in an irregular form, then lines the inside with gum in order to make the cocoon stiff and impenetrable to the inclemency of the severest weather. In this condition the chrysalis remains through the whole winter and until the following summer, when they awake by

the spiritual rapping of the warm element, rise from their graves clad in an orange and purple dress, and ascend towards the sky as perfect moths.

This Nocturnal Lepidoptera received its name after Juno, the daughter of Saturn, also called Saturnia, and her priestess, Io.

The Saturnia Io is represented in Plate VI. fig. 28, the male with four, and the female with two globular black spots on the wings. The female is the larger, and differs in color.

The Silkworm-Moth. (Bombyx mori.)

Of all the lepidopterous insects, this is the most celebrated, and the most useful to man, and consequently deserves as extended a notice as the limits of this work will allow. It is generally known, that most of the caterpillars, at the period of their metamorphosis, envelope themselves with a silky web, which forms the inner part of the cocoon. But it is not, perhaps, so well known how this silk is obtained from the caterpillar, nor to what extent this most valuable of all the products of insects could be cultivated in this country.

It is true, that mankind have lived, and could live, without the use of silk, and the same might be said of almost all our luxuries; but whoever has witnessed the steady progress of refinement in manners and cus-

toms, which has attended the increase of luxuries in society, will be careful how he speaks against the use of an article, which gives employment to many thousands of people in its first production, and furnishes many hundreds of thousands with food and raiment, by its final manufacture, and has already become one of the most important sources of national wealth. Besides, were it not for the use of silk and its costliness, it is probable that our woollen, cotton and linen stuffs, would be much dearer than they are, and much harder for poor people to obtain. Silk stuffs, are moreover, an appendage of rank and office, without which, insignificant courts, ignorant ambassadors, and many other brainless people, would lose their whole splendor and influence.

Silk has always been an expensive article, and has a curious history. It was once valued at its weight in gold, at Rome. The extravagant Julius Cæsar covered the stage of the theatre with a silken carpet, but the emperor Tiberius prohibited gentlemen from wearing silk dresses, because he considered it effeminate. The emperors Caligula and Heliogabalus dressed themselves throughout in silk ; but Aurelian was so impolite and so penurious, that he refused even his empress a robe of silk on account of its costliness.

Kirby and Spence, in their "Introduction to Entomology," mention, that "James the First, king of Scotland, was forced to beg of the Earl of Mar, the loan of

a pair of silk stockings, to appear in before the English ambassador, enforcing his request with the cogent appeal, 'For ye would not, sure, that your king should appear as a scrub before strangers.'"

Aristotle, in the third century B. C., and Pliny, in the first century, A. D., both speak of the use of silk.

The ancient Greeks and Romans procured their silk from Persia, in which country silk-worms have been raised from the remotest antiquity. And when I saw the great number of wild silk-worms in Cachetia, Imeritia, Mingrelia, Georgia, Shirvan, and Dagestan, the modern provinces of ancient Media, as far as to the heights of the Caucasus, near Tiflis, the idea occurred to me, that the fabulous story of the golden fleece of the Argonauts must have had its origin, or reference to that rich silk country. These beautiful provinces are now in the possession of Russia, and are called Transcaucasia, and they with the Crimea form the richest and most productive countries of the Russian empire.

These Elysian fields induced my friend Castellás, of Paris, now deceased, to settle in Tiflis, and encouraged by the emperor Nicholas, in 1826, to erect large establishments for the cultivation of silk in Tiflis, Karaback, Shirvan, Noukha and Imeretia, of which he showed me the plans, when I was there, in 1825. In these vast establishments, he employed twenty-seven thousand hands, including eight hundred Italian men

and women, and in the first year of their operation, 1,200,000 pounds of fine floss silk were produced and sold, which, valued at four dollars per pound, amounts to four millions eight hundred thousand dollars. Mr. Castellás presented me with several bundles of the silk which he manufactured, and it was pronounced far superior in quality to the French or Italian silk, by every connoisseur to whom I showed it afterwards in my travels through Germany and France.

That enterprising and excellent man died two years after I left the Crimea, and while I was in St. Domingo, and my 'deep grief at his untimely departure and my loss, were only assuaged by the sweet hope of once more meeting him beyond the grave. He has left this world forever, and his grand and extensive establishments have probably perished from neglect; for a country where 1,200,000 idle soldiers rule the inhabitants with a rod of iron and suck their life-blood, cannot well, or long succeed in such enterprises.

It seems to me a matter of regret, and a great deficiency in our views of political economy, that the people of the United States of America have not been more persevering and successful in raising their own silk, for the importation of which, they pay so many millions of dollars annually. It is true, that a few individuals here and there, are occupied in this lucrative branch of industry, and I was happy to be able to purchase some fine silk handkerchiefs at Rapp's Econ-

omy, eighteen miles below Pittsburg, on the Ohio, which were manufactured there out of silk of their own raising. But this is like a drop of water to the vast ocean, in a country of so immense an area, and of a population that will soon reach fifty millions. It is not a visionary project, or a "*morus multicaulis*" speculation, that I would encourage; but if our government would protect this branch of industry by a suitable tariff, the cultivation of silk-worms and the manufacture of silk, could be made a profitable business. Families in the middle States of the Union, might thus employ many old and infirm men and women, as well as children when not in school, and in the southern States could do the same with negro children, as well as with the old men and women who have become incapacitated for hard work.

To plant a large number of white mulberry trees, for the purpose of raising silk-worms is neither difficult nor expensive, and whoever raises a large quantity of cocoons may be sure of a ready cash sale of them, and at a great profit.

All the silks and silk-stuffs of commerce originate from the common silk-worm, but there exist several other species of nocturnal Lepidoptera in America and in Asia, which produce silk of a different kind, of which no use, or a very limited one is made: as for instance, that of the *Bombyx Madrono*, mentioned in Humboldt's travels, which is found in the province of

Mechoacau, in Mexico, at the height of 10,500 feet above the level of the sea. Handkerchiefs are manufactured of this silk by the inhabitants of Oaxaca.

The cocoons of the large North American Moths, *Cecropia*, *Luna*, *Polyphemus* and *Promethea*, which I shall illustrate in the succeeding volume, contain much silk, a single fibre of which is at least ten times as thick as one of the common silk-worm, an experiment I have often made myself. Stuffs made out of this silk would far exceed the common fabrics in strength and durability, and could not probably be worn out in many years.

In India, silk is also obtained from the cocoons of other Moths, in relation to which, Kirby and Spence say, "Of these, the most important species known, are the Tusseh and Arindy Silkworms. These insects are both natives of Bengal. The first, *Attacus Papilio*, Lin, feeds upon the leaves of the jujube tree, or Byer of the Hindoos, and upon the *Fernalia alata glabra*, Roxb, the Asseen of the Hindoos, and is found in such abundance as from time immemorial to have afforded a constant supply of a very durable, coarse, dark colored silk, which is woven into a cloth called Tusseh-doothies. This fabric is much worn by the Brahmins and other sects, and would be highly useful to the inhabitants of many parts of America, and the south of Europe, where a light and cool, and at the same time, a cheap and

durable dress, such as this silk furnishes, is much wanted. The durability of this silk is really astonishing, as after constant use for nine or ten years, it does not show the least appearance of wear or decay. The insects which make this silk, are thought by the natives of so much consequence, that they guard them by day to preserve them from crows and other birds, and by night from the bats. The second, the Arindy Silkworm, *Phalæna Cynthia*, Drury, feeds solely on the leaves of the *Palma Christi*, and produces remarkably soft cocoons, the silk of which is so delicate and flossy that it is impracticable to wind it off, like other silk, from the cocoons; it is, therefore, spun like cotton, and the thread thus manufactured, is woven into a coarse kind of white cloth of a loose texture, but of still more incredible durability than the other, the life time of one person being seldom sufficient to wear out a garment made of it. It is used, not only for clothing, but for packing fine cloths. Some manufacturers in England, to whom the silk was shown, seemed to think that it could there be made into shawls equal to any received from India.

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